04/15/2005

Rico Soils

4/15/2005

DOL

Voluntary Cleanup - Technical - Attachments accompanying letter dated April 15, 2005 (Stillwell / Atlantic Richfield to Stoner / CDPHE) Re: Application for Certificate of Designation - Rico Soil Lead

RV/2./2073

RV/2./1890

RV040220-1

Attachments accompanying letter dated April 15, 2005 (Stillwell/Atlantic Richfield to Stoner/CDPHE) Re: Application for Certificate of Designation – Rico Soil Lead Repository

Submitted to:

Colorado Department of Public Health and Environment

Submitted by:

Atlantic Richfield Company

April 15, 2005

Contents

Attachment 1
Geotechnical Laboratory Test Results

ATTERBERG LIMITS
ASTM D 4318

ATTERBERG LIMITS TEST
ASTM D 4318

CLIENT	SEH	JOB NO.	2505-04
BORING NO.	EW-1	DATE SAMPLED	
DEPTH	10-12',13-15',17-19'	DATE TESTED	12-22-04 SKL
SAMPLE NO.			
SOIL DESCR.	Project #AARCOE0105.00		
LOCATION	Rico Soil Lead Repository		

Plastic Limit Determination

	1	2	3
Wt Dish & Wet Soil	6.86	7.05	6.88
Wt Dish & Dry Soil	6.09	6.19	6.05
Wt of Moisture	0.77	0.86	0.83
Wt of Dish	0.82	0.78	0.81
Wt of Dry Soil	5.27	5.41	5.24
Moisture Content	14.61	15.90	15.84

Liquid Limit Determination — Device Number 0860

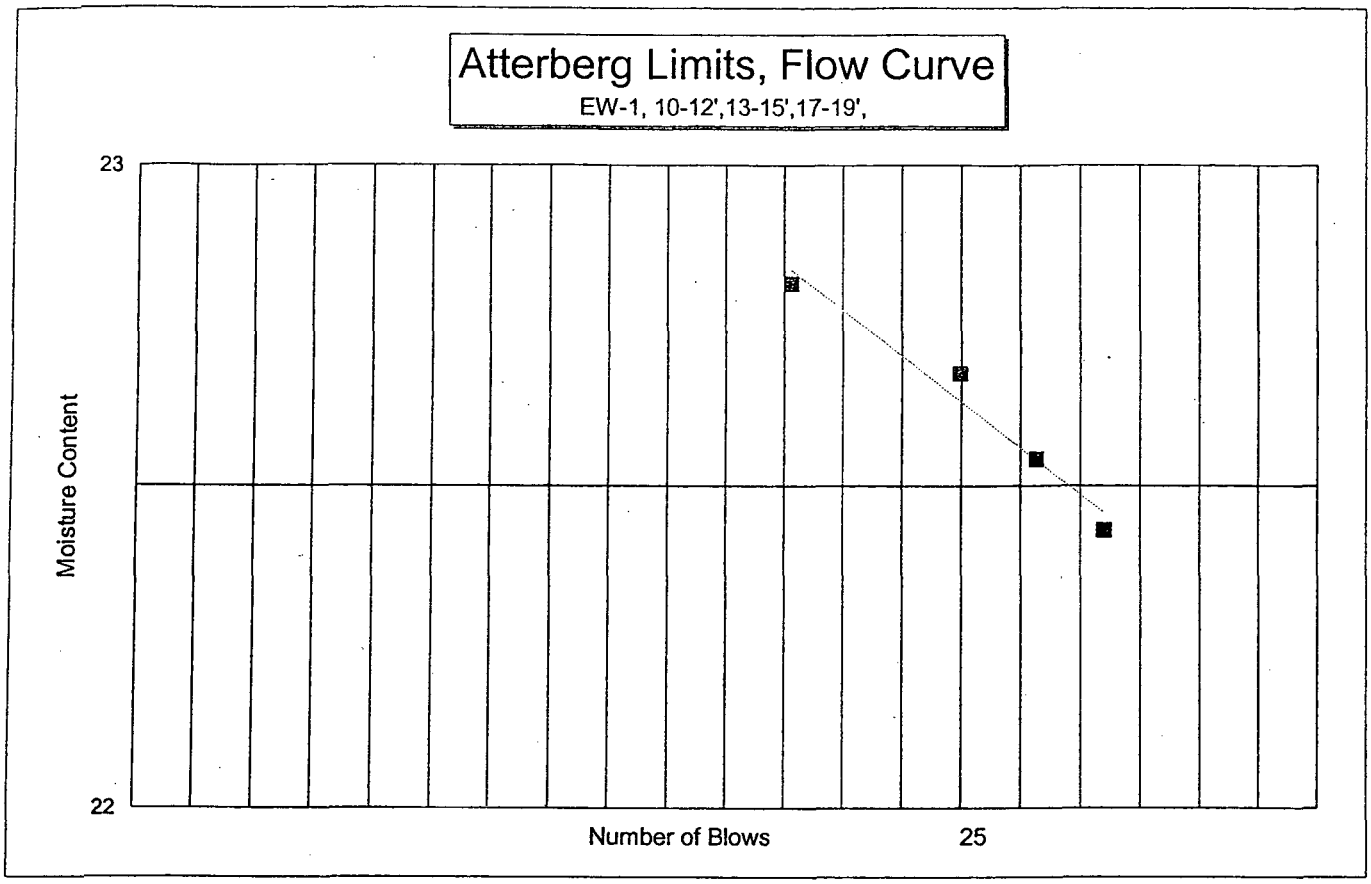
	1	2	3	4
Number of Blows	18	25	29	33
Wt Dish & Wet Soil	9.81	9.21	9.78	9.23
Wt Dish & Dry Soil	8.14	7.65	8.13	7.68
Wt of Moisture	1.67	1.56	1.65	1.55
Wt of Dish	0.82	0.77	0.81	0.77
Wt of Dry Soil	7.32	6.88	7.32	6.91
Moisture Content	22.81	22.67	22.54	22.43

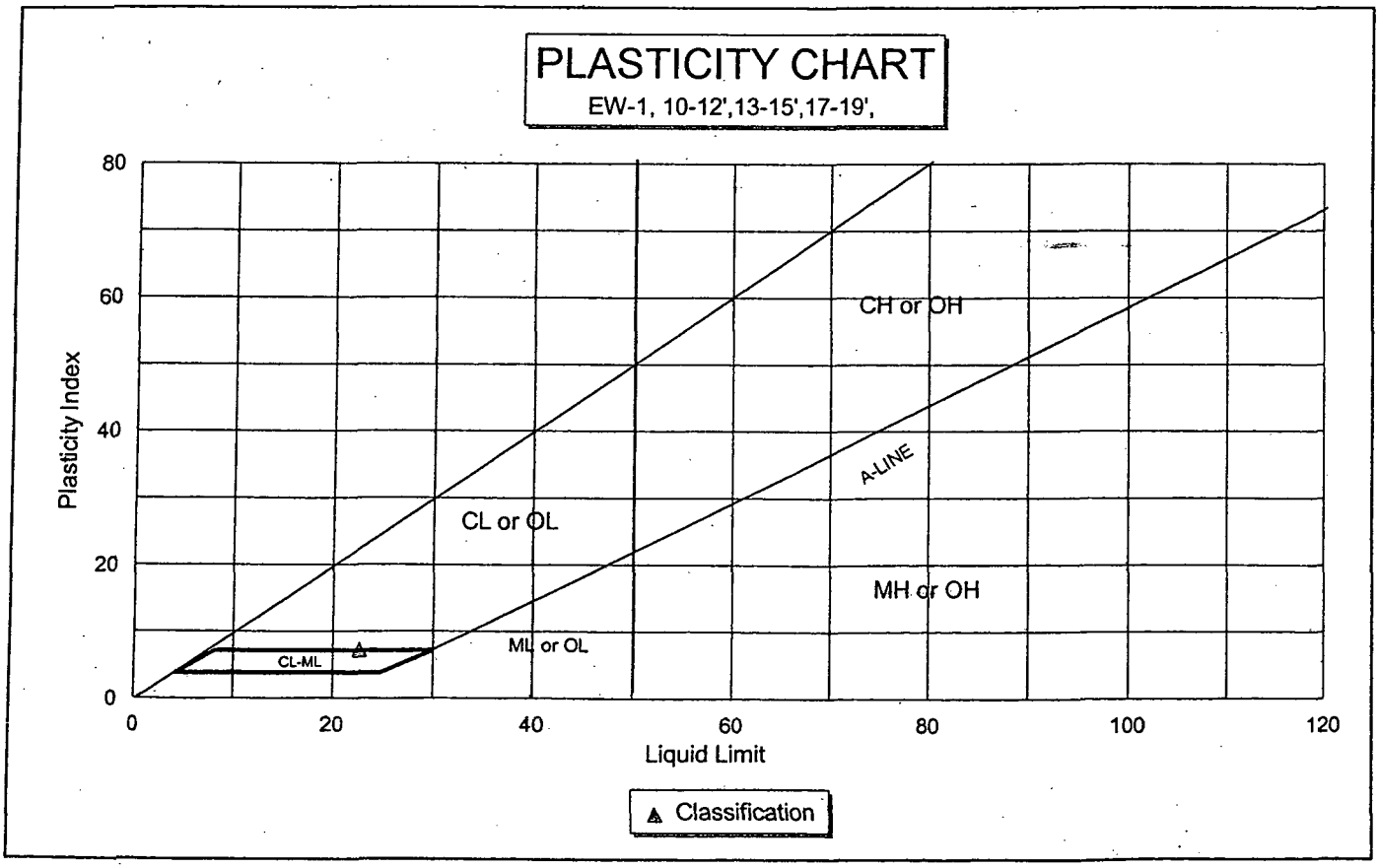
Liquid Limit	22.6
Plastic Limit	15.4
Plasticity Index	7.2

Atterberg Classification CL

Data entry by: SR Date: 12/23/2004
Checked by: SHL Date: 12/23/04
FileName: SHG01315

ADVANCED TERRA TESTING, INC.


Atterberg Limits, Flow Curve
EW-1, 10-12',13-15',17-19',
23
22
Moisture Content
Number of Blows
25


PLASTICITY CHART
EW-1, 10-12',13-15',17-19',
80
60
40
20
0
Plasticity Index
CH or OH
A-LINE
CL or OL
MH or OH
CL-ML
ML or OL
0
20
40
60
80
100
120
Liquid Limit
Classification

ATTERBERG LIMITS TEST
ASTM D 4318

CLIENT	SEH	JOB NO.	2505-04
BORING NO.	EW-1	DATE SAMPLED	
DEPTH	15-17'	DATE TESTED	12-16&20-04
SAMPLE NO.			SKL
SOIL DESCR.	Project #AARCOE0105.00		
LOCATION	Rico Soil Lead Repository		

Plastic Limit Determination

	1	2	3
Wt Dish & Wet Soil	6.53	6.80	6.04
Wt Dish & Dry Soil	5.77	6.03	5.33
Wt of Moisture	0.76	0.77	0.71
Wt of Dish	0.74	0.81	0.76
Wt of Dry Soil	5.03	5.22	4.57
Moisture Content	15.11	14.75	15.54

Liquid Limit Determination — Device Number 0860

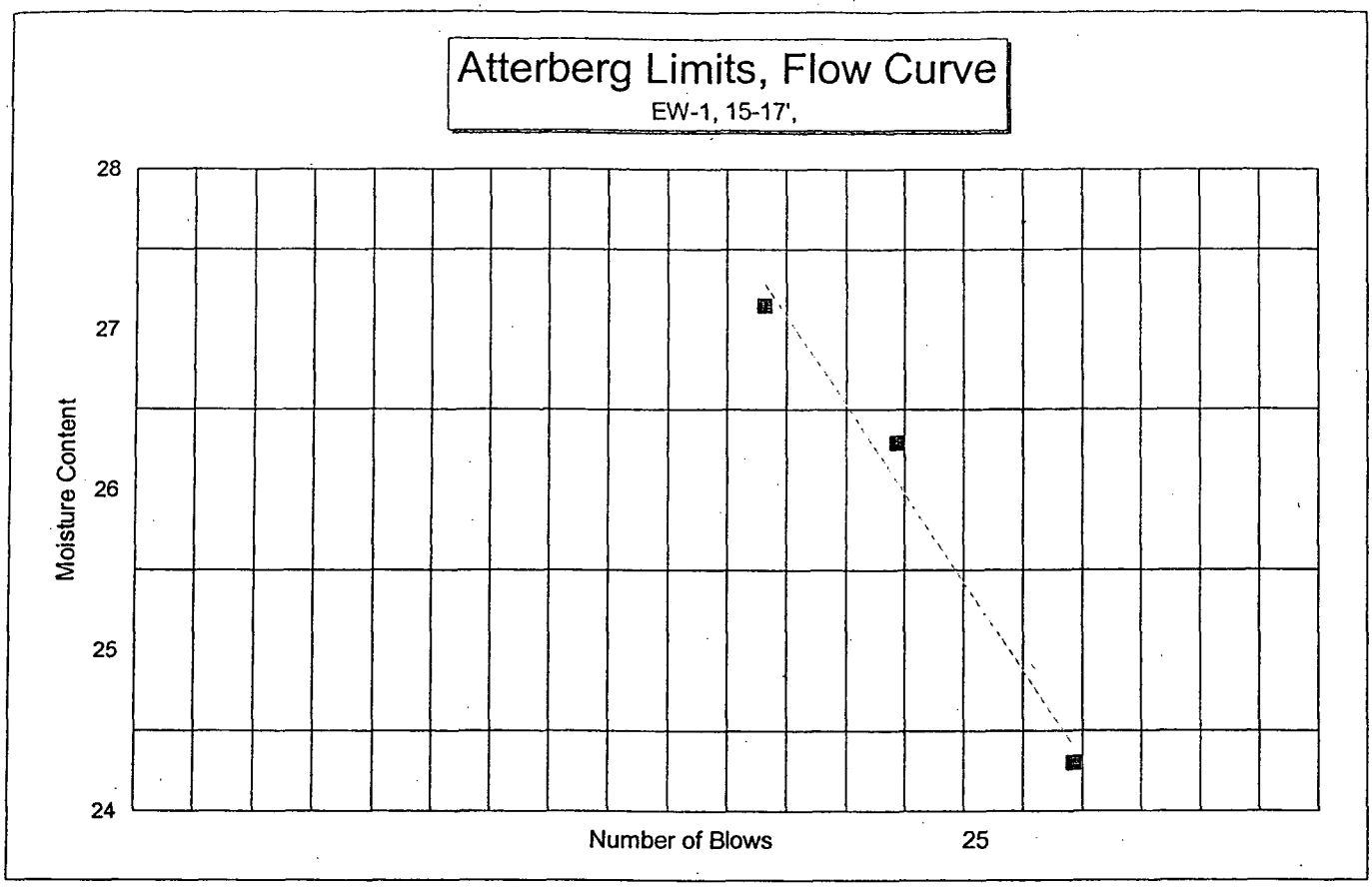
	1	2	3
Number of Blows	17	22	31
Wt Dish & Wet Soil	8.21	9.61	9.72
Wt Dish & Dry Soil	6.63	7.78	7.98
Wt of Moisture	1.58	1.83	1.74
Wt of Dish	0.81	0.82	0.82
Wt of Dry Soil	5.82	6.96	7.16
Moisture Content	27.15	26.29	24.30

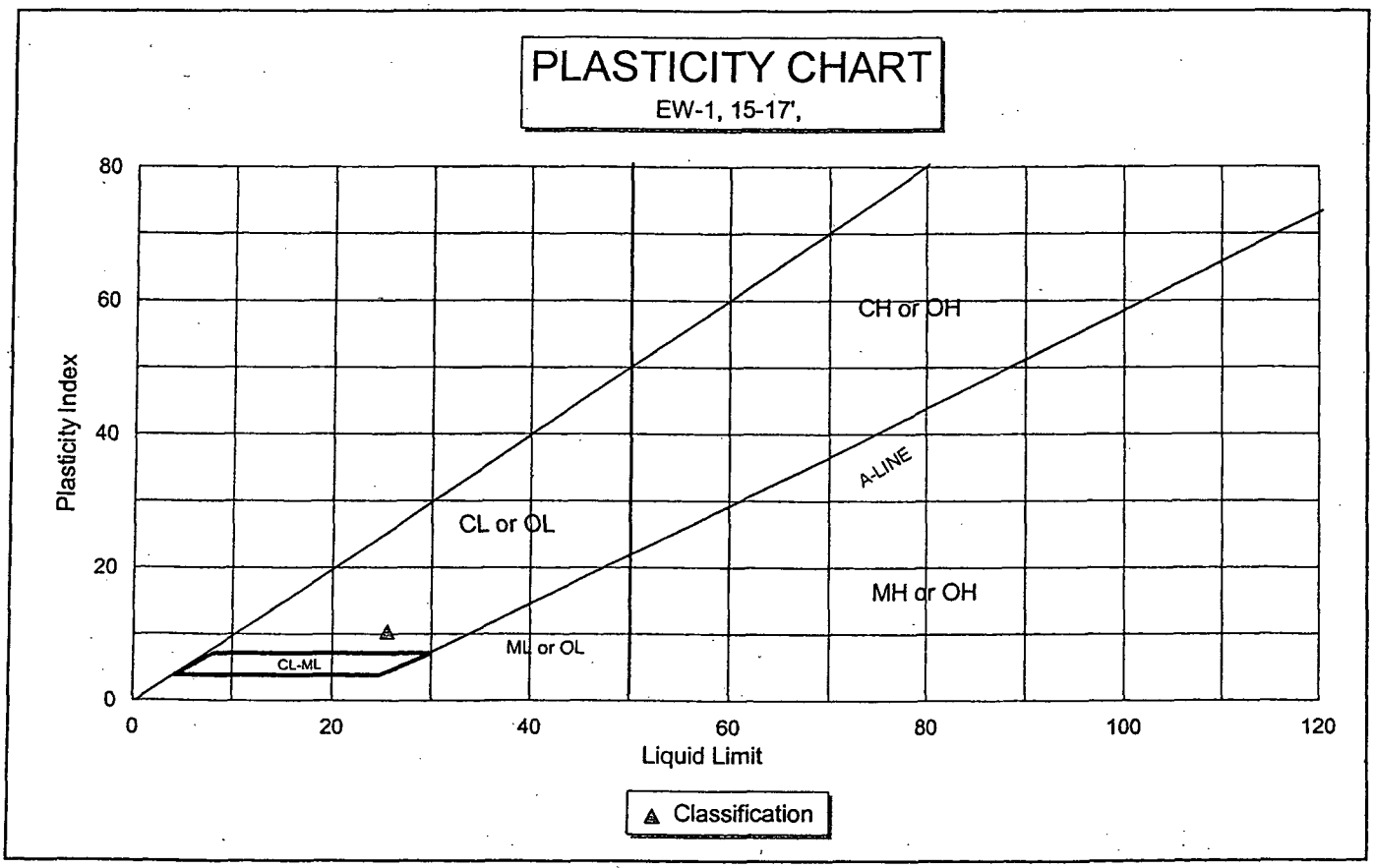
Liquid Limit	25.4
Plastic Limit	15.1
Plasticity Index	10.3

Atterberg Classification CL

Data entry by: SR Date: 12/21/2004
Checked by: SHG Date: 12/21/04
FileName: SHG0EW1

ADVANCED TERRA TESTING, INC.


Atterberg Limits, Flow Curve
EW-1, 15-17',
Moisture Content
28
27
26
25
24
Number of Blows
25


PLASTICITY CHART
EW-1, 15-17',
Plasticity Index
80
60
40
20
0
CH or OH
A-LINE
CL or OL
MH or OH
CL-ML
ML or OL
0
20
40
60
80
100
120
Liquid Limit
Classification

ATTERBERG LIMITS TEST
ASTM D 4318

CLIENT	SEH	JOB NO.	2505-04
BORING NO.	EW-1	DATE SAMPLED	
DEPTH	5-7',7.5-9.5'	DATE TESTED	12-22-04 SKL
SAMPLE NO.			
SOIL DESCR.	Project #AARCOE0105.00		
LOCATION	Rico Soil Lead Repository		

Plastic Limit Determination

	1	2	3
Wt Dish & Wet Soil	6.71	6.70	6.76
Wt Dish & Dry Soil	5.95	5.92	5.96
Wt of Moisture	0.76	0.78	0.80
Wt of Dish	0.81	0.81	0.81
Wt of Dry Soil	5.14	5.11	5.15
Moisture Content	14.79	15.26	15.53

Liquid Limit Determination — Device Number 0860

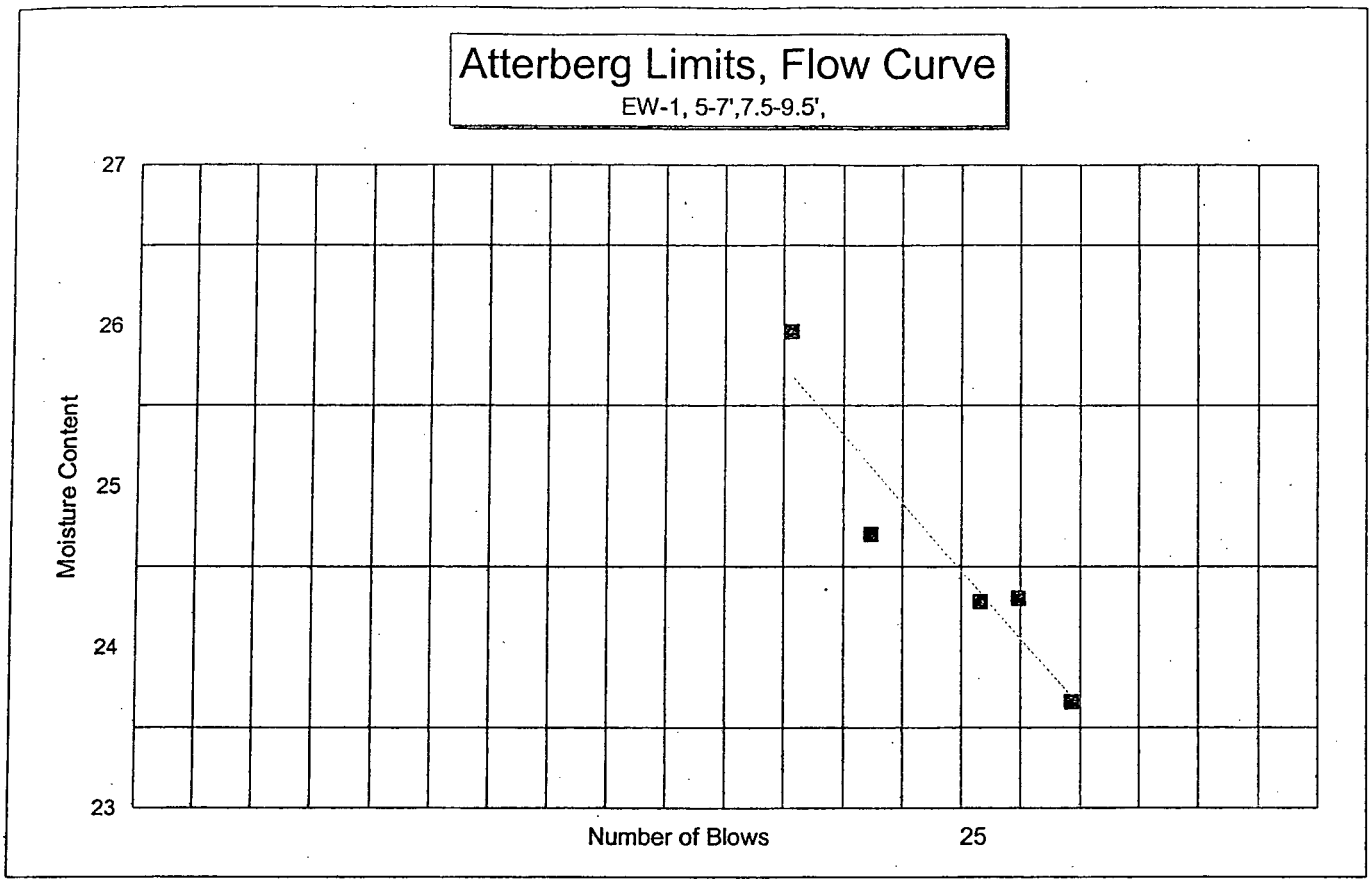
	1	2	3	4	5
Number of Blows	18	21	26	31	28
Wt Dish & Wet Soil	10.33	10.25	10.33	10.27	10.64
Wt Dish & Dry Soil	8.37	8.38	8.47	8.46	8.72
Wt of Moisture	1.96	1.87	1.86	1.81	1.92
Wt of Dish	0.82	0.81	0.81	0.81	0.82
Wt of Dry Soil	7.55	7.57	7.66	7.65	7.90
Moisture Content	25.96	24.70	24.28	23.66	24.30

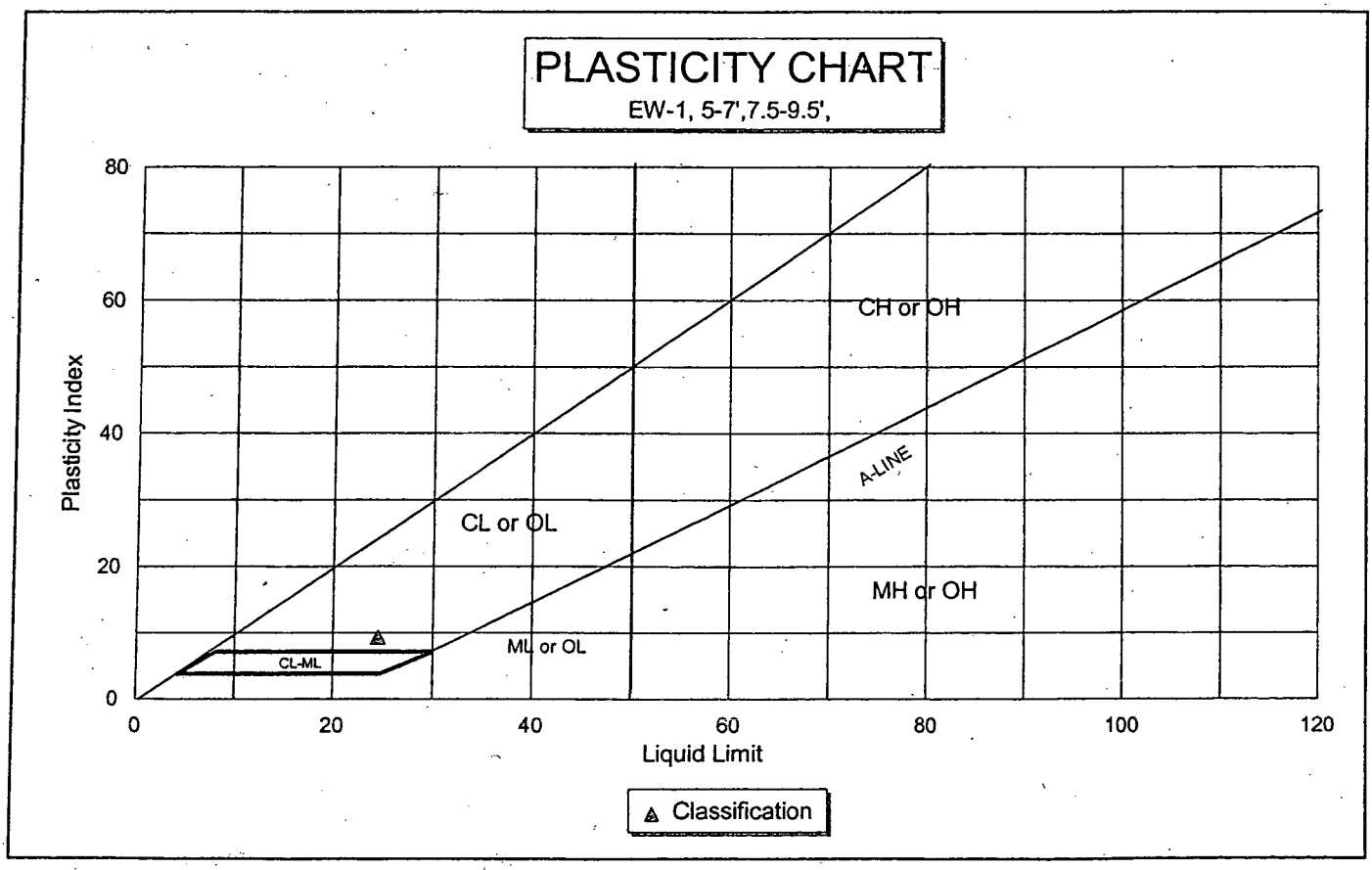
Liquid Limit	24.5
Plastic Limit	15.2
Plasticity Index	9.3

Atterberg Classification CL

Data entry by: SR Date: 12/23/2004
Checked by: SHR Date: 12/23/04
FileName: SHG05775

ADVANCED TERRA TESTING, INC.


Atterberg Limits, Flow Curve
EW-1, 5-7',7.5-9.5',
Moisture Content
27
26
25
24
23
Number of Blows
25


PLASTICITY CHART
EW-1, 5-7',7.5-9.5',
Plasticity Index
80
60
40
20
0
CH or OH
A-LINE
CL or OL
MH or OH
CL-ML
ML or OL
0
20
40
60
80
100
120
Liquid Limit
Classification

ATTERBERG LIMITS TEST
ASTM D 4318

CLIENT	SEH	JOB NO.	2505-04
BORING NO.	EW-1	DATE SAMPLED	
DEPTH	0-2',2.5-4.5'	DATE TESTED	12-22-04 SKL
SAMPLE NO.			
SOIL DESCR.	Project #AARCOE0105.00		
LOCATION	Rico Soil Lead Repository		

Plastic Limit Determination

	1	2	3
Wt Dish & Wet Soil	6.82	6.42	6.73
Wt Dish & Dry Soil	5.92	5.63	5.86
Wt of Moisture	0.90	0.79	0.87
Wt of Dish	0.82	0.81	0.81
Wt of Dry Soil	5.10	4.82	5.05
Moisture Content	17.65	16.39	17.23

Liquid Limit Determination — Device Number 0860

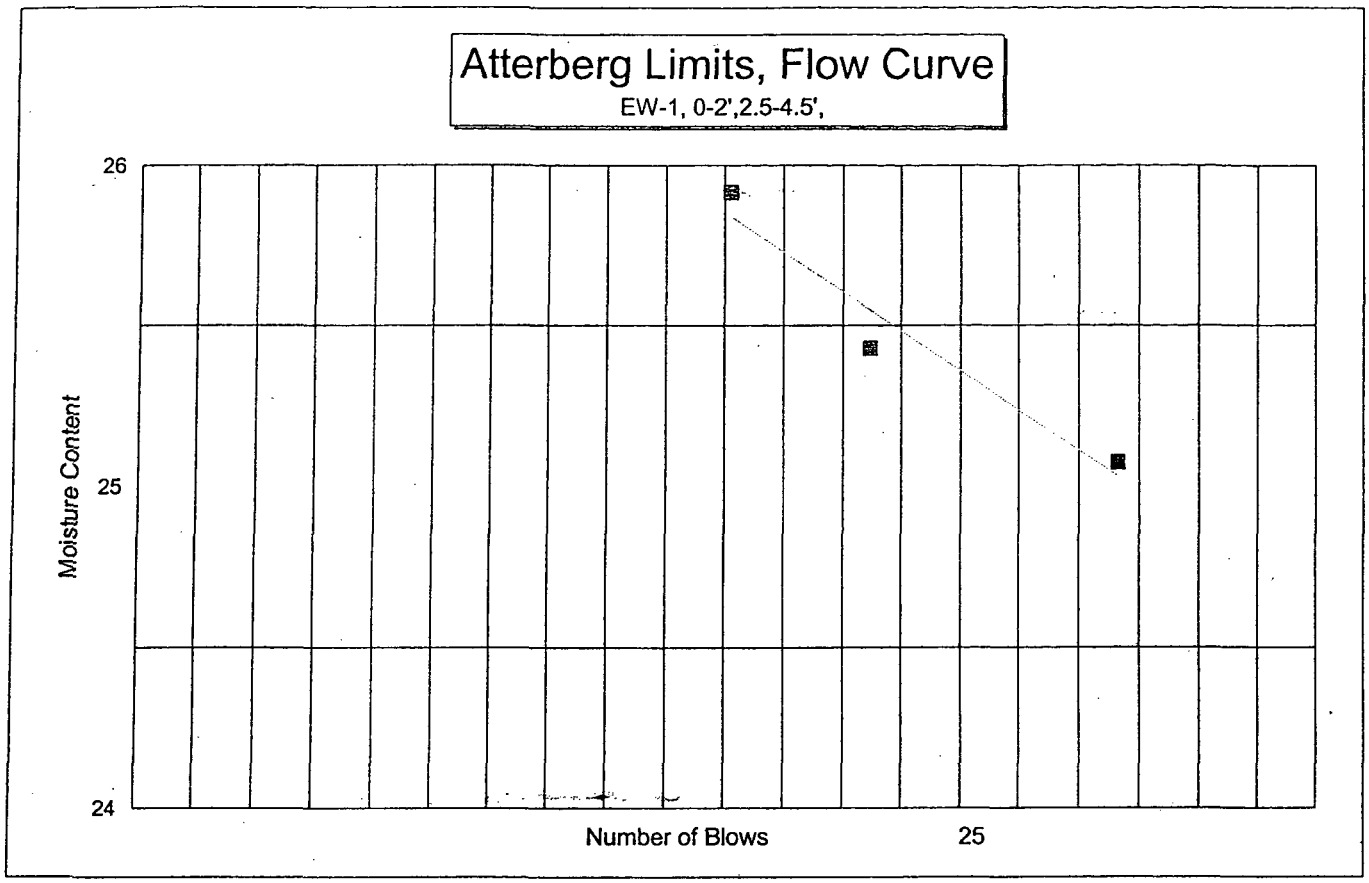
	1	2	3
Number of Blows	16	21	34
Wt Dish & Wet Soil	10.09	9.59	9.20
Wt Dish & Dry Soil	8.18	7.81	7.51
Wt of Moisture	1.91	1.78	1.69
Wt of Dish	0.81	0.81	0.77
Wt of Dry Soil	7.37	7.00	6.74
Moisture Content	25.92	25.43	25.07

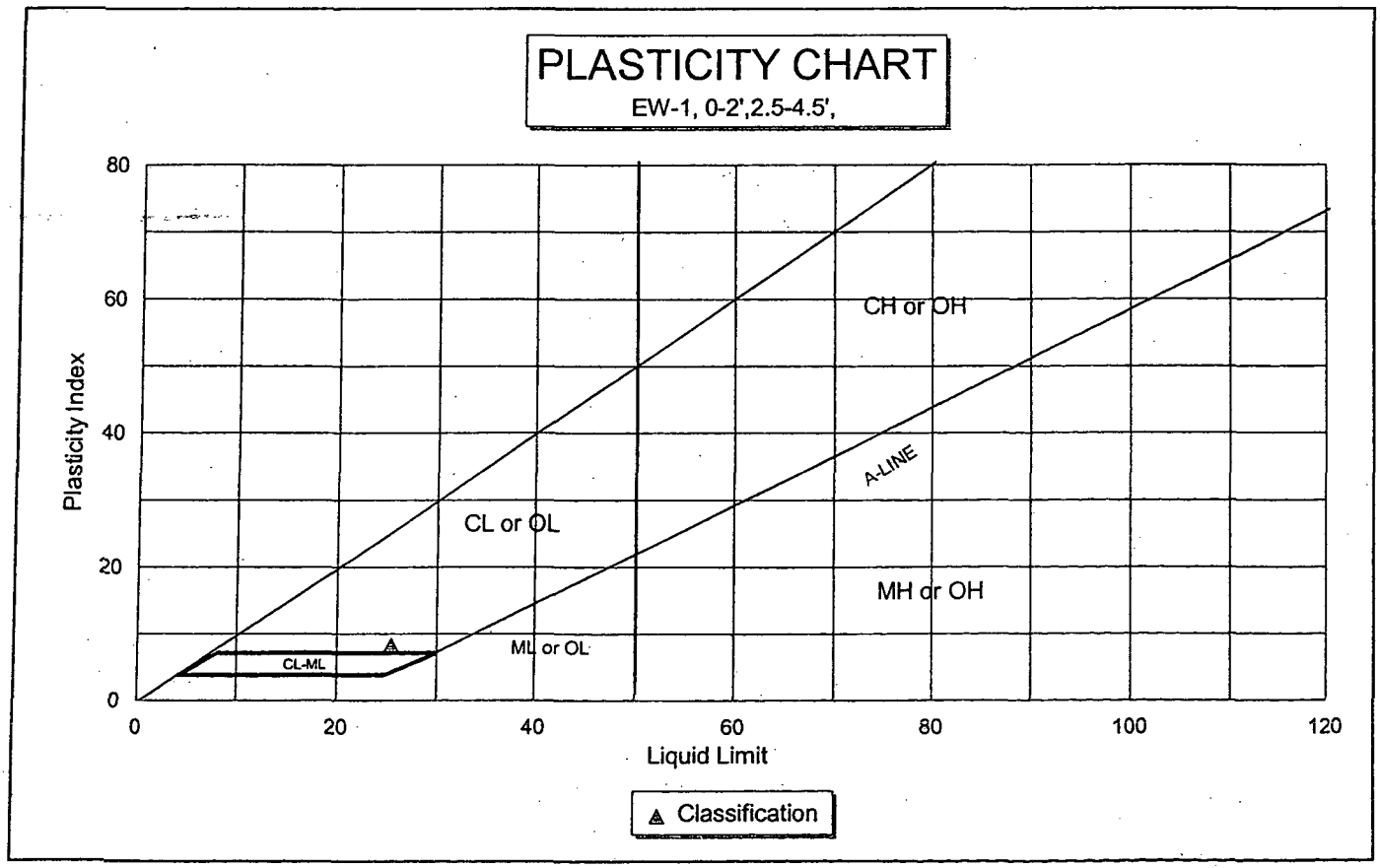
Liquid Limit	25.4
Plastic Limit	17.1
Plasticity Index	8.3

Atterberg Classification CL

Data entry by: SR Date: 12/23/2004
Checked by: SKL Date: 12/29/04
FileName: SHG00225

ADVANCED TERRA TESTING, INC.


Atterberg Limits, Flow Curve
EW-1, 0-2',2.5-4.5',
26
25
24
Moisture Content
Number of Blows
25


PLASTICITY CHART
EW-1, 0-2',2.5-4.5',
80
60
40
20
0
Plasticity Index
0
20
40
60
80
100
120
Liquid Limit
CH or OH
A-LINE
CL or OL
MH or OH
CL-ML
ML or OL
Classification

ATTERBERG LIMITS TEST
ASTM D 4318

CLIENT	SEH	JOB NO.	2505-04
BORING NO.	EW-2A	DATE SAMPLED	
DEPTH	~~10-12',12-14'~~ 8'-12' ACJ 4/10/05	DATE TESTED	12-22-04 AG
SAMPLE NO.			
SOIL DESCR.	Project #AARCOE0105.00		
LOCATION	Rico Soil Lead Repository		

Plastic Limit Determination

	1	2	3
Wt Dish & Wet Soil	6.63	6.71	6.63
Wt Dish & Dry Soil	5.78	5.85	5.81
Wt of Moisture	0.85	0.86	0.82
Wt of Dish	0.81	0.81	0.81
Wt of Dry Soil	4.97	5.04	5.00
Moisture Content	17.10	17.06	16.40

Liquid Limit Determination — Device Number 0966

	1	2	3
Number of Blows	21	26	30
Wt Dish & Wet Soil	12.76	12.31	11.45
Wt Dish & Dry Soil	9.85	9.56	8.93
Wt of Moisture	2.91	2.75	2.52
Wt of Dish	0.76	0.82	0.81
Wt of Dry Soil	9.09	8.74	8.12
Moisture Content	32.01	31.46	31.03

Liquid Limit	31.5
Plastic Limit	16.9
Plasticity Index	14.7

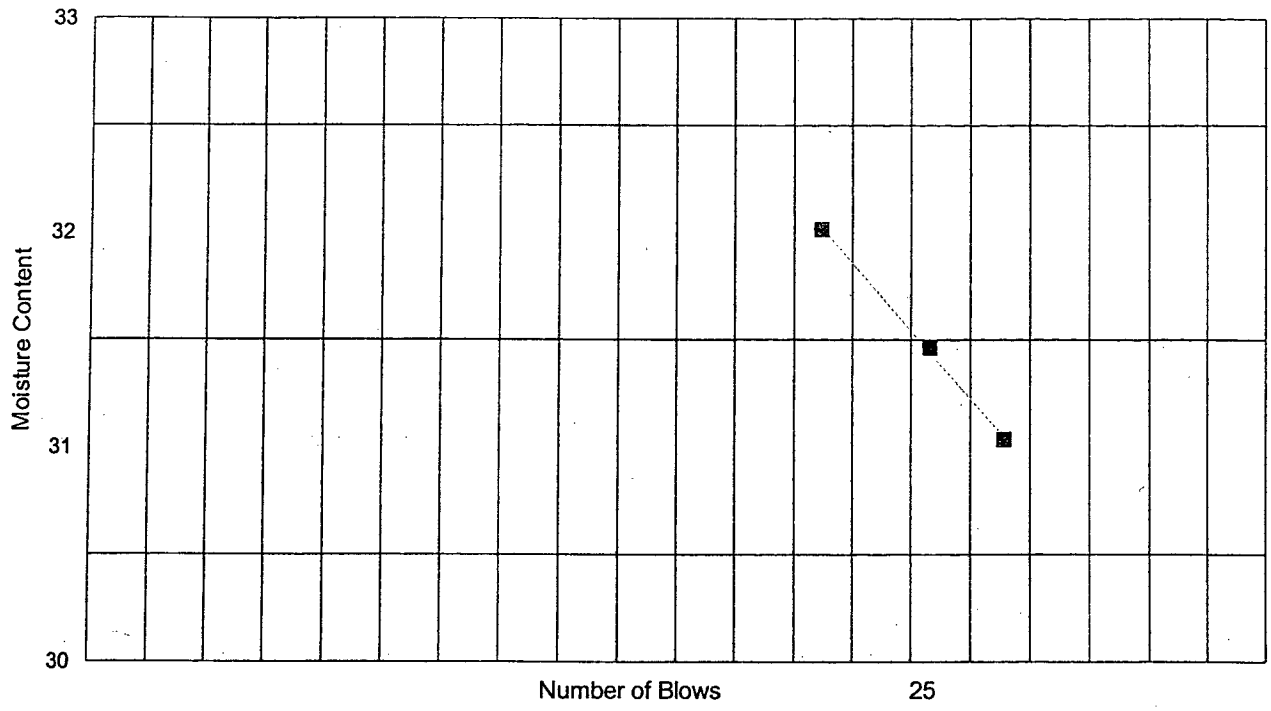
Atterberg Classification CL

Data entry by: SR Date: 12/23/2004
Checked by: SHG Date: 12/23/04
FileName: SHG01012

ADVANCED TERRA TESTING, INC.

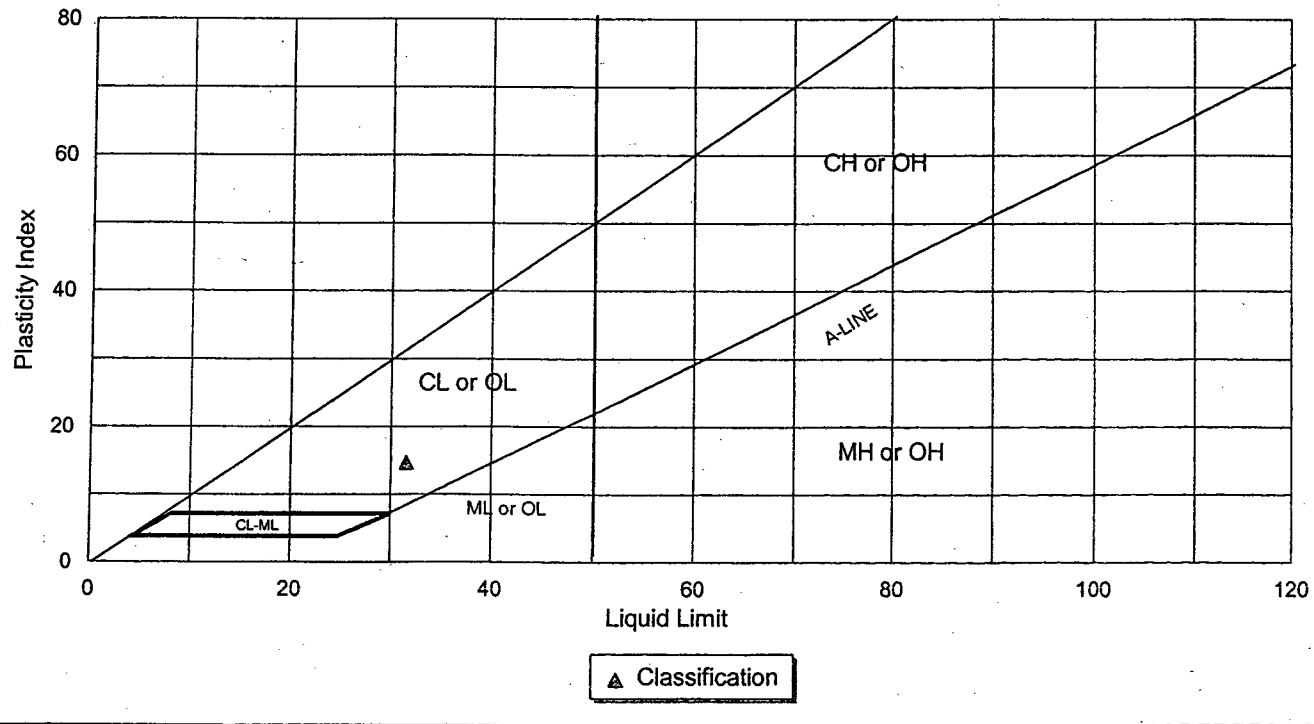
Atterberg Limits, Flow Curve

EW-2A, ~~10-12', 12-14'~~, 8'-12' ACS 4/10/05



PLASTICITY CHART

EW-2A, ~~10-12', 12-14'~~, 8'-12' ACS 4/10/05



GRAIN SIZE ANALYSIS
¾ INCH TO - #200 SEIVE
ASTM D 422

MECHANICAL ANALYSIS - SIEVE TEST DATA
ASTM D 422

CLIENT	SEH	JOB NO.	2505-04
BORING NO.	EW-2A	SAMPLED	
DEPTH	~~10-12',12-14'~~ 8-12' ACS 4/10/05	DATE TESTED	12-22-04 AG
SAMPLE NO.		WASH SIEVE	Yes
SOIL DESCR.	Project #AARCOE0105-00	DRY SIEVE	No
LOCATION	Rico Soil Lead Repository		

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan (g)	51.26
Wt. Dry Soil & Pan (g)	50.01
Wt. Lost Moisture (g)	1.25
Wt. of Pan Only (g)	3.69
Wt. of Dry Soil (g)	46.32
Moisture Content %	2.7
Wt. Hydrom. Sample Wet (g)	225.10
Wt. Hydrom. Sample Dry (g)	219.19

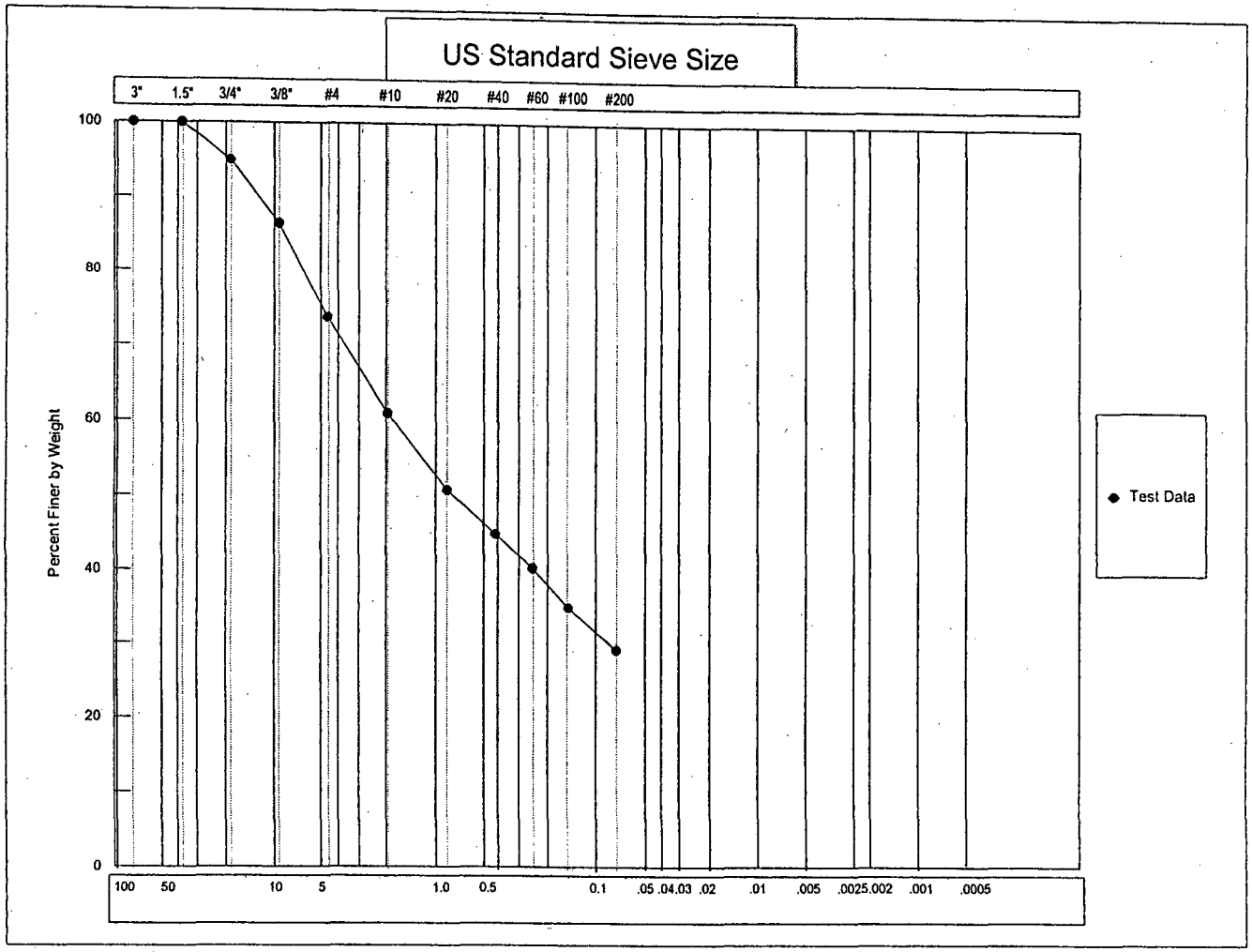
WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	1500.96
Weight of + #10 Before Washing (g)	601.93
Weight of + #10 After Washing (g)	577.33
Weight of - #10 Wet (g)	899.03
Weight of - #10 Dry (g)	899.36
Wt. Total Sample Dry (g)	1476.69
Calc. Wt. "W" (g)	359.89
Calc. Mass + #10	140.70

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	74.45	74.45	74.45	5.0	95.0
3/8"	0.00	126.51	126.51	200.96	13.6	86.4
#4	0.00	188.77	188.77	389.73	26.4	73.6
#10	0.00	187.60	187.60	577.33	39.1	60.9
#20	4.04	40.79	36.75	36.75	49.3	50.7
#40	3.69	24.81	21.12	57.87	55.2	44.8
#60	3.66	20.11	16.45	74.32	59.7	40.3
#100	3.63	22.76	19.13	93.45	65.1	34.9
#200	3.64	24.49	20.85	114.30	70.9	29.1

Data entered by: SHM01012 Date: 12/23/2004
Data checked by: SHL Date: 12/23/04
FileName: SR

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	USCS
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY	WENTWORTH
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE			

Client: SEH
Job Number: 2505-04
Classification: **Classification Not Performed**

Boring No.: EW-2A
Depth: ~~10-12', 12-14'~~ 8'-12' AG 4/10/05

Sample No.:

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA
ASTM D 422

CLIENT	SEH	JOB NO.	2505-04
BORING NO.	EW-1	SAMPLED	
DEPTH	10-12',13-15',17-19'	DATE TESTED	12-22-04 AG
SAMPLE NO.		WASH SIEVE	Yes
SOIL DESCR.	Project #AARCOE0105-00	DRY SIEVE	No
LOCATION	Rico Soil Lead Repository		

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan (g)	60.75
Wt. Dry Soil & Pan (g)	59.98
Wt. Lost Moisture (g)	0.77
Wt. of Pan Only (g)	3.70
Wt. of Dry Soil (g)	56.28
Moisture Content %	1.4
Wt. Hydrom. Sample Wet (g)	196.47
Wt. Hydrom. Sample Dry (g)	193.82

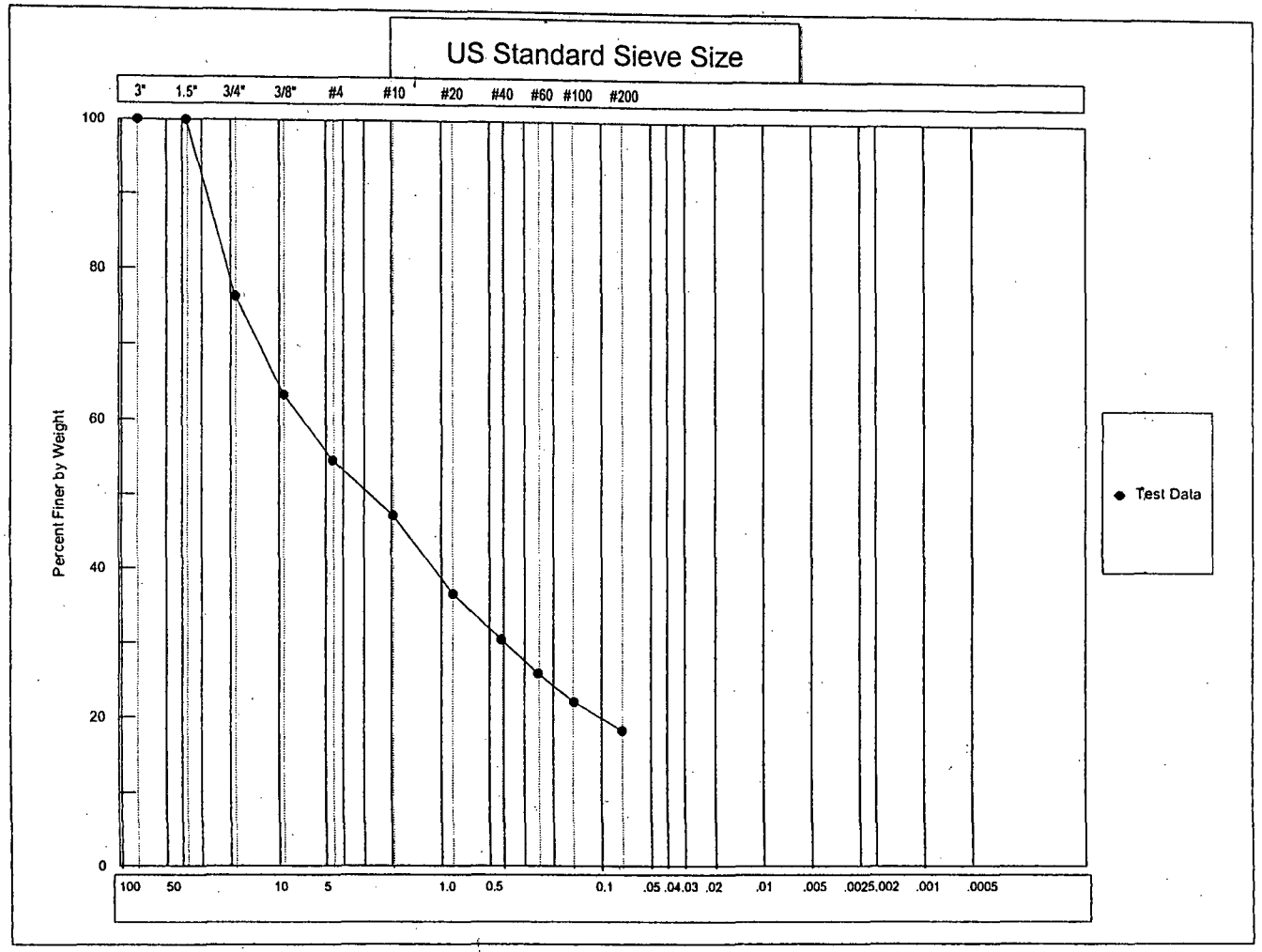
WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	1057.95
Weight of + #10 Before Washing (g)	573.58
Weight of + #10 After Washing (g)	556.51
Weight of - #10 Wet (g)	484.37
Weight of - #10 Dry (g)	494.67
Wt. Total Sample Dry (g)	1051.18
Calc. Wt. "W" (g)	411.87
Calc. Mass + #10	218.05

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	248.09	248.09	248.09	23.6	76.4
3/8"	0.00	137.50	137.50	385.59	36.7	63.3
#4	0.00	92.04	92.04	477.63	45.4	54.6
#10	0.00	78.88	78.88	556.51	52.9	47.1
#20	3.63	46.79	43.16	43.16	63.4	36.6
#40	3.67	28.83	25.16	68.32	69.5	30.5
#60	3.61	22.25	18.64	86.96	74.1	25.9
#100	3.68	19.67	15.99	102.95	77.9	22.1
#200	3.62	19.03	15.41	118.36	81.7	18.3

Data entered by: SHM01315 Date: 12/23/2004
Data checked by: SHL Date: 12/23/04
FileName: SR

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	CRS	MEDIUM	FINE	

USCS

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WENTWORTH

Client: SEH Boring No.: EW-1 Sample No.:
Job Number: 2505-04 Depth: 10-12',13-15',17-19'
Classification: **Classification Not Performed**

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA
ASTM D 422

CLIENT	SEH	JOB NO.	2505-04
BORING NO.	EW-1	SAMPLED	
DEPTH	0-2',2.5-4.5'	DATE TESTED	12-22-04 AG
SAMPLE NO.		WASH SIEVE	Yes
SOIL DESCR.	Project #AARCOE0105-00	DRY SIEVE	No
LOCATION	Rico Soil Lead Repository		

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan (g)	36.77
Wt. Dry Soil & Pan (g)	36.36
Wt. Lost Moisture (g)	0.41
Wt. of Pan Only (g)	3.72
Wt. of Dry Soil (g)	32.64
Moisture Content %	1.3
Wt. Hydrom. Sample Wet (g)	96.35
Wt. Hydrom. Sample Dry (g)	95.15

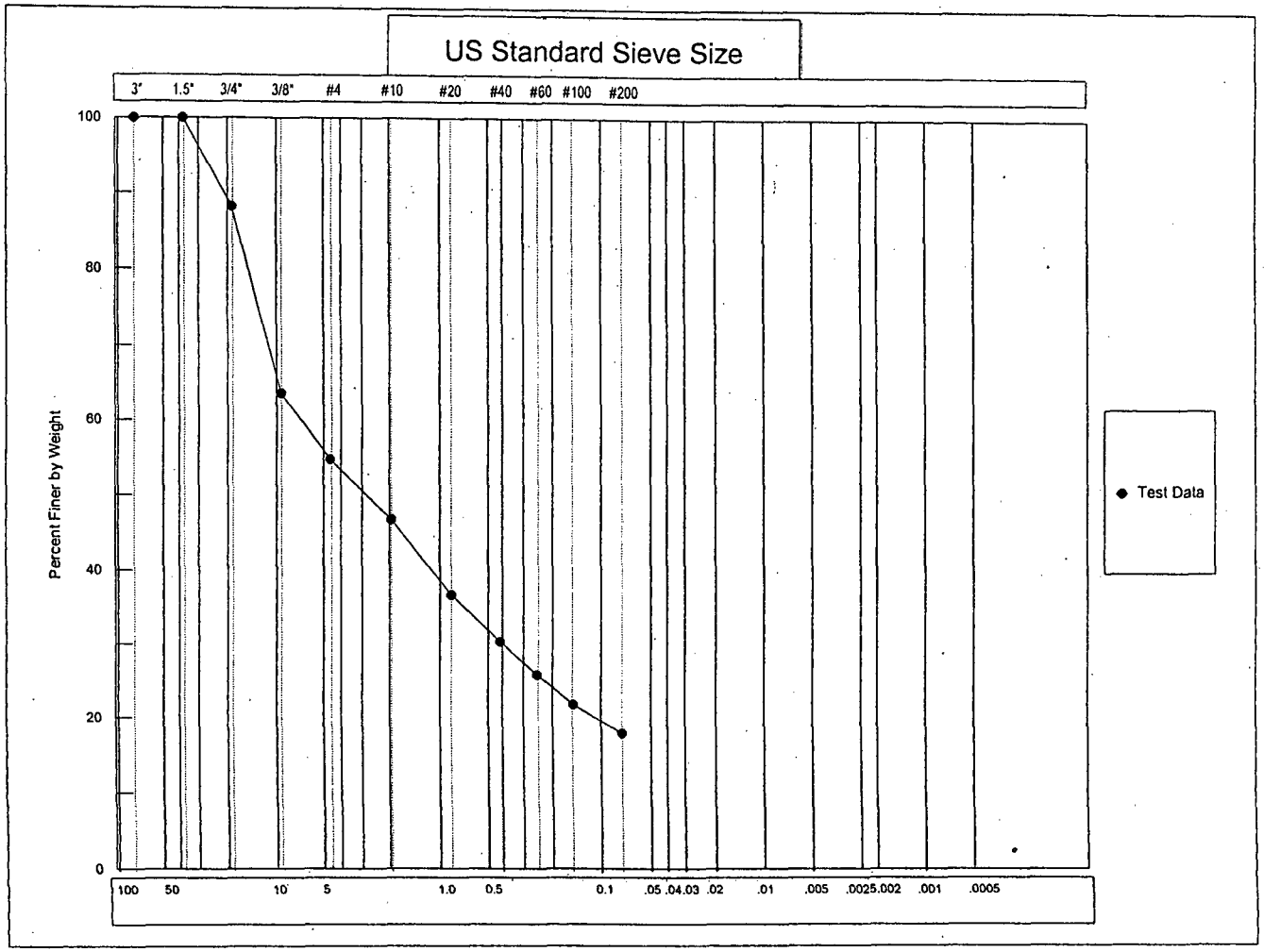
WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	573.72
Weight of + #10 Before Washing (g)	312.97
Weight of + #10 After Washing (g)	304.23
Weight of - #10 Wet (g)	260.75
Weight of - #10 Dry (g)	266.15
Wt. Total Sample Dry (g)	570.38
Calc. Wt. "W" (g)	203.93
Calc. Mass + #10	108.77

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	67.63	67.63	67.63	11.9	88.1
3/8"	0.00	140.54	140.54	208.17	36.5	63.5
#4	0.00	50.78	50.78	258.95	45.4	54.6
#10	0.00	45.28	45.28	304.23	53.3	46.7
#20	3.77	24.23	20.46	20.46	63.4	36.6
#40	3.65	16.53	12.88	33.34	69.7	30.3
#60	3.69	12.93	9.24	42.58	74.2	25.8
#100	3.53	11.78	8.25	50.83	78.3	21.7
#200	3.62	11.57	7.95	58.78	82.2	17.8

Data entered by: SHM00225 Date: 12/23/2004
Data checked by: SHL Date: 12/23/04
FileName: SR

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	CRS	MEDIUM	FINE	

USCS

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WENTWORTH

Client: SEH
Job Number: 2505-04
Classification: **Classification Not Performed**

Boring No.: EW-1
Depth: 0-2',2.5-4.5'

Sample No.:

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA
ASTM D 422

CLIENT	SEH	JOB NO.	2505-04
BORING NO.	EW-1	SAMPLED	
DEPTH	5-7',7.5-9.5'	DATE TESTED	12-22-04 AG
SAMPLE NO.		WASH SIEVE	Yes
SOIL DESCR.	Project #AARCOE0105-00	DRY SIEVE	No
LOCATION	Rico Soil Lead Repository		

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan (g)	40.64
Wt. Dry Soil & Pan (g)	40.17
Wt. Lost Moisture (g)	0.47
Wt. of Pan Only (g)	3.61
Wt. of Dry Soil (g)	36.56
Moisture Content %	1.3
Wt. Hydrom. Sample Wet (g)	174.87
Wt. Hydrom. Sample Dry (g)	172.65

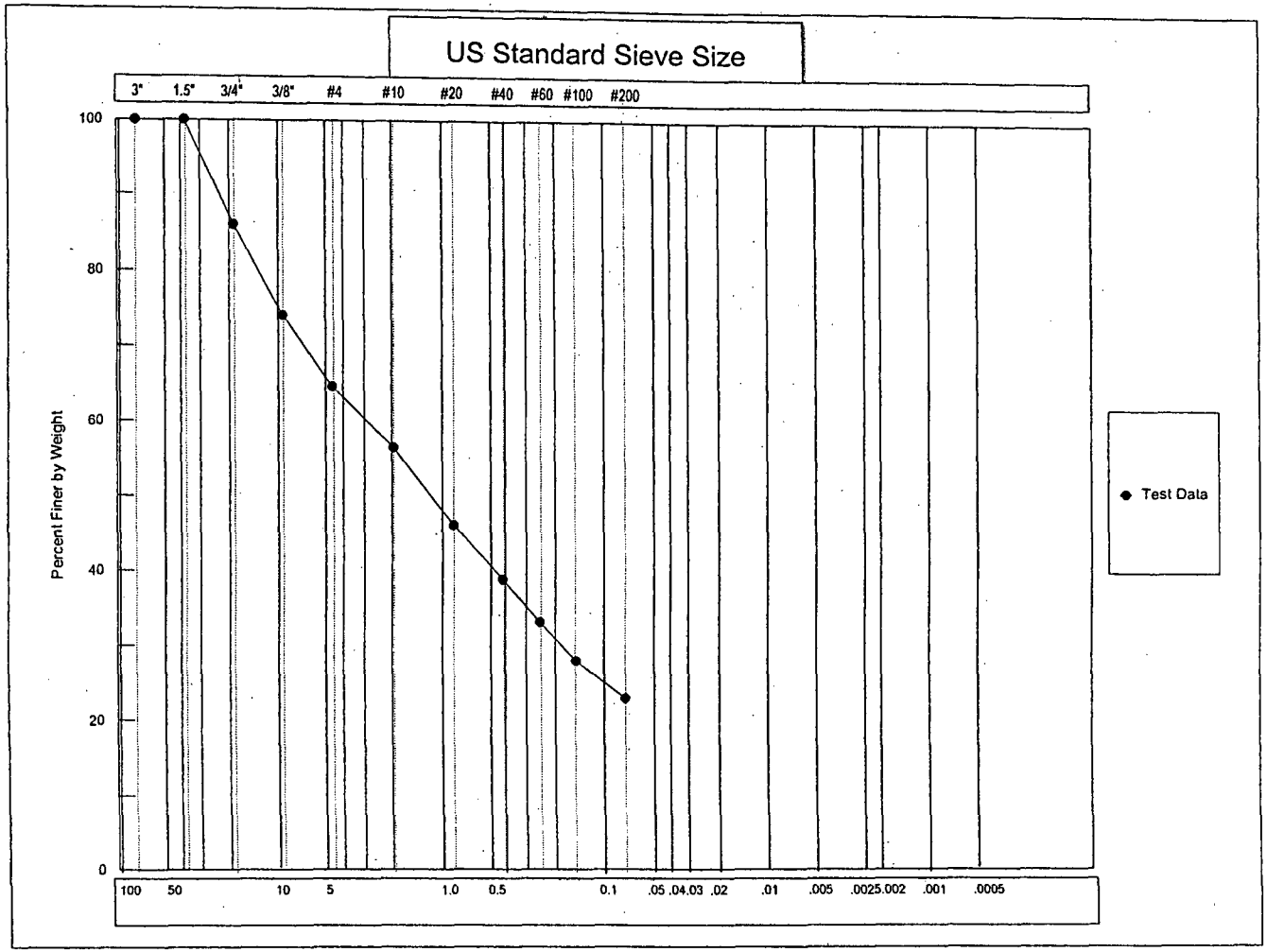
WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	743.58
Weight of + #10 Before Washing (g)	335.93
Weight of + #10 After Washing (g)	321.80
Weight of - #10 Wet (g)	407.65
Weight of - #10 Dry (g)	416.43
Wt. Total Sample Dry (g)	738.23
Calc. Wt. "W" (g)	306.07
Calc. Mass + #10	133.42

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	103.87	103.87	103.87	14.1	85.9
3/8"	0.00	87.91	87.91	191.78	26.0	74.0
#4	0.00	70.32	70.32	262.10	35.5	64.5
#10	0.00	59.70	59.70	321.80	43.6	56.4
#20	3.67	35.76	32.09	32.09	54.1	45.9
#40	3.72	25.57	21.85	53.94	61.2	38.8
#60	3.65	21.05	17.40	71.34	66.9	33.1
#100	3.68	19.52	15.84	87.18	72.1	27.9
#200	3.64	18.95	15.31	102.49	77.1	22.9

Data entered by: SHM05775 Date: 12/23/2004
Data checked by: SHL Date: 12/23/04
FileName: SR

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	CRS	MEDIUM	FINE	

USCS

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WENTWORTH

Client: SEH
Job Number: 2505-04
Classification: **Classification Not Performed**

Boring No.: EW-1
Depth: 5-7',7.5-9.5'

Sample No.:

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA
ASTM D 422

CLIENT	SEH	JOB NO.	2505-04
BORING NO.	EW-1	SAMPLED	
DEPTH	15-17'	DATE TESTED	12/17/04 AG
SAMPLE NO.		WASH SIEVE	Yes
SOIL DESCR.	Project #AARCOE0105.00	DRY SIEVE	No
LOCATION	Rico Soil Lead Repository		

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan (g)	33.62
Wt. Dry Soil & Pan (g)	33.30
Wt. Lost Moisture (g)	0.32
Wt. of Pan Only (g)	3.78
Wt. of Dry Soil (g)	29.52
Moisture Content %	1.1
Wt. Hydrom. Sample Wet (g)	150.73
Wt. Hydrom. Sample Dry (g)	149.11

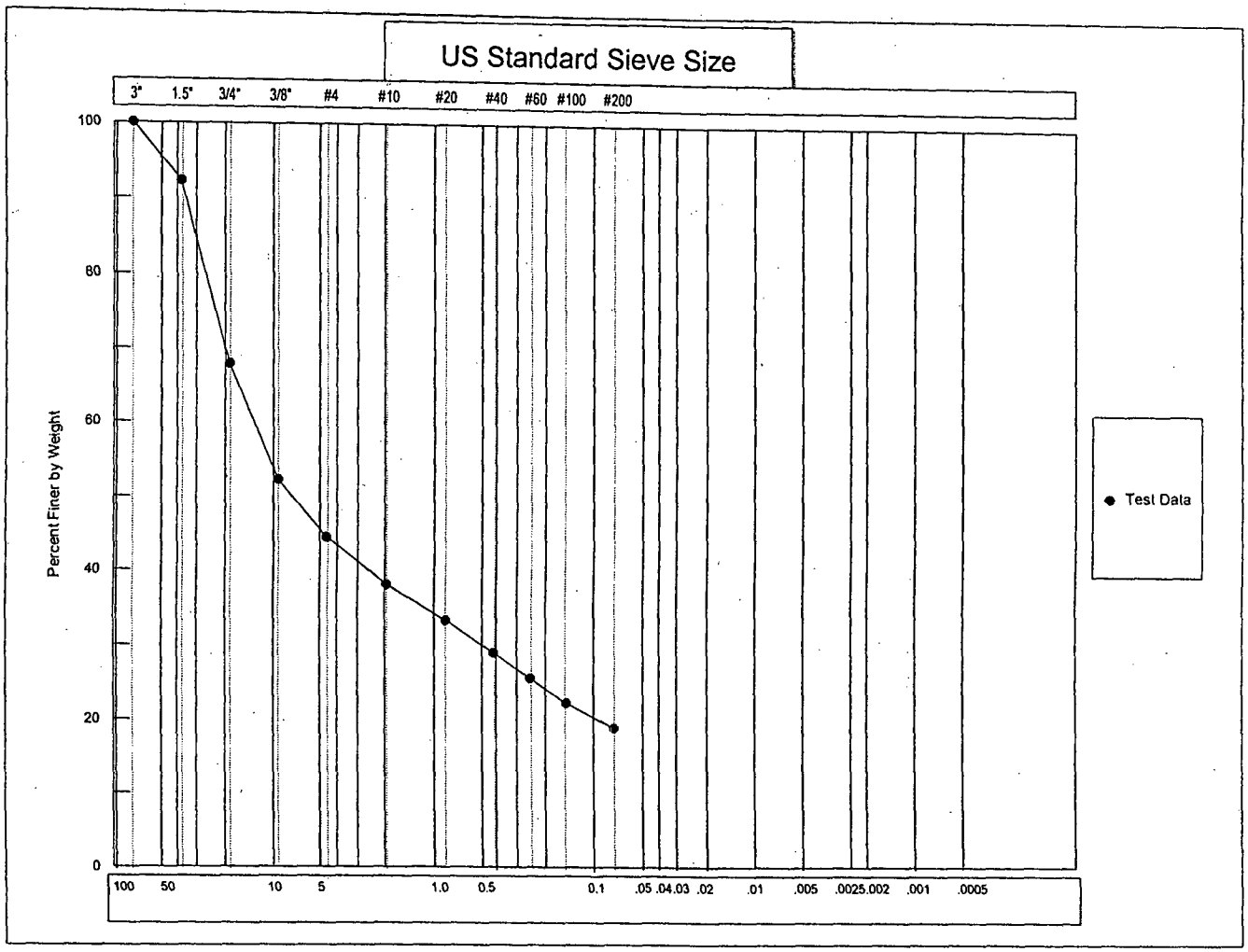
WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	1039.14
Weight of + #10 Before Washing (g)	690.94
Weight of + #10 After Washing (g)	641.19
Weight of - #10 Wet (g)	348.20
Weight of - #10 Dry (g)	393.68
Wt. Total Sample Dry (g)	1034.87
Calc. Wt. "W" (g)	391.97
Calc. Mass + #10	242.86

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	80.24	80.24	80.24	7.8	92.2
3/4"	0.00	252.36	252.36	332.60	32.1	67.9
3/8"	0.00	162.10	162.10	494.70	47.8	52.2
#4	0.00	80.17	80.17	574.87	55.5	44.5
#10	0.00	66.32	66.32	641.19	62.0	38.0
#20	3.61	22.14	18.53	18.53	66.7	33.3
#40	3.73	20.40	16.67	35.20	70.9	29.1
#60	3.67	17.16	13.49	48.69	74.4	25.6
#100	3.68	16.62	12.94	61.63	77.7	22.3
#200	3.68	16.93	13.25	74.88	81.1	18.9

Data entered by: RS Date: 12/20/2004
Data checked by: cal Date: 12/20/04
FileName: SHM0EW1

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	CRS	MEDIUM	FINE	

USCS

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WENTWORTH

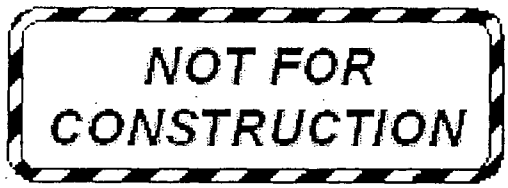
Client: SEH
Job Number: 2505-04
Classification: **Classification Not Performed**

Boring No.: EW-1
Depth: 15-17'

Sample No.:

Advanced Terra Testing, Inc.

Attachment 2
Technical Specifications



SECTION 130 – SUBMITTALS

130.01 GENERAL

A. DESCRIPTION: The following specification includes the procedures for submitting "Shop Drawings" and any and all other required submittals as required in these Technical Specifications and in Exhibit A and Exhibit B of the Contract Documents. Items that need to be reviewed by Atlantic Richfield are included with this specification. Also refer to the "Submittal" section of each Technical Specification section for additional requirements.

B. DEFINITIONS:

1. Shop Drawings: The term "shop drawings" includes drawings, diagrams, layouts, schematics, descriptive literature, manufacturer's information, illustrations, schedules, performance and test data, and similar materials requested by Atlantic Richfield to be furnished by the Contractor to explain in detail specific portions of the Work required by the Contract.

2. Contractor's Review and Approval: The Contractor shall coordinate all submittals and review them for accuracy, completeness, and compliance with contract requirements and shall indicate his approval thereon as evidence of such coordination and review. All submittals shall be attached to the "Shop Drawing Submission" Form that is included in this Contract Document. The form shall be filled out, signed and stamped by the Contractor. Items submitted to Atlantic Richfield without this form or Contractor's stamp and approval will be returned for resubmission. By attaching this form to the submittal, the Contractor is representing that he has reviewed the entire submittal, that the submittal is in compliance with the Contract Documents, except as noted, and that the cover form applies to all documents that are attached to the form.

130.02 PRODUCTS

A. NONE.

130.03 EXECUTION

A. SUBMITTAL PROCEDURE: Shop Drawings shall be submitted as follows:

1. Date and Number: Contractor shall forward to Atlantic Richfield all submittals required by the individual sections of the specifications. All submittals shall be returned to the Contractor within 7 days following their initial review. If follow-up reviews are required they shall be reviewed within 5 days. Unless a different number is called for in the individual sections, submit six copies of each shop drawing, six copies of all operation and maintenance instructions, and four specimens of each

sample requested, of which all but two copies will be retained by Atlantic Richfield. The other copies shall be returned to the Contractor along with Atlantic Richfield's comments. If the Contractor wants more than two copies sent to him he shall submit whatever additional copies he desires.

2. Cover Letter: All submittals shall be forwarded with a cover letter from the Contractor, identifying the project and the portion of the project to which it applies. Submittals that are related to or affect each other shall be forwarded simultaneously as a package to facilitate a coordinated review. Uncoordinated submittals will be rejected.

3. Modifications: Any modifications to the design proposed by the Contractor, shall be fully explained in the submittal. All necessary calculations and supporting documentation shall be included. If requested by Atlantic Richfield, the Contractor shall provide design drawings of the modification stamped by a professional engineer licensed to practice in the State of Colorado.

130.04 ATLANTIC RICHFIELD'S APPROVAL

Atlantic Richfield will indicate its approval or disapproval of each submittal and, if it does not approve the submittal as submitted, will indicate the reasons therefore. Any work done prior to approval shall be at the Contractor's own risk. Neither approvals nor lack of reviews or approval shall relieve the Contractor from responsibility for supplying materials and performing all work in accordance with the requirements of these Contract Documents. If submittals show variations from the Contract requirements, the Contractor shall describe such variations in writing, on the before mentioned form at the time of submission. Approval of such variation(s) shall be accompanied with a Contract Modification. Minor variations not involving a change in price or time of performance will not be issued a modification.

130.05 REQUIRED SUBMITTALS

A. Permits: Submit to Atlantic Richfield a copy of all permits required by the governing authorities, for which the Contractor is responsible.

B. Subcontractors: The Contractor shall supply a list of all suppliers and subcontractors to be used on the project.

C. Certificates: For those items called for in individual sections, furnish certificates from manufacturers, suppliers, or others certifying that materials or equipment being furnished under the Contract comply with the requirements of these specifications.

D. Shop Drawings: Including all materials and equipment supplied on the project. See the individual sections for specific requirements. If an alternate is proposed,

TRANSMITTAL OF REQUIRED SUBMITTALS	DATE		NEW SUBMITTAL		RESUBMITTAL
Atlantic Richfield Company 317 Anaconda Road Butte, Montana 59701 ATTN: Jack Marjerison CC: Jesse Fuller (1 copy each) Atlantic Richfield Company Burley Building, Suite No. 150 11 S. Glasgow Avenue Rico, Colorado 81332	FROM:				TRANSMITTAL NO. PROJECT NO.
	PROJECT TITLE AND LOCATION:				

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED (Type, size, model number, etc.)		MANUFACTURER OR SUPPLIER	NO. OF COPIES	SPECIFICATION PARAGRAPH & PAGE NO.	DRAWING NO.	BID TEM NO.
1							
2							
3							
4							
5							

LIST ALL VARIANCES FROM CONTRACT DOCUMENT REQUIREMENTS

I hereby certify that all Contractor's responsibilities under the Contract Documents with respect to review and submission of the above shop drawings have been satisfied and that each shop drawing has been stamped and/or marked to indicate Contractor's compliance with the Shop Drawing review requirements.

SIGNED_____

(NAME & TITLE)

SECTION 160: EXISTING UTILITIES

160.01 GENERAL

A. DESCRIPTION - The following specification includes requirements for notifying utility owners and possibly relocating utilities that may be affected by the Work. This shall include gas (including propane), water, sewer (including septic systems), phone, electric, and any other utilities encountered by the Work.

B. UNDERGROUND UTILITIES - The location of underground utilities are not shown on the Drawings; locates that may be shown on Individual Site Work Plans (ISWPs) are for the purposes of design only and shall not be relied upon by the Contractor; and Atlantic Richfield Company assumes no responsibility for determining the exact location of utilities. Failure by Atlantic Richfield to show the existence of subsurface objects or installations on the Drawings shall not relieve the Contractor from his responsibility to locate and mark all buried utilities, nor relieve him from all liability for damages resulting from his operations.

The Contractor shall protect from damage private and public utilities, including telephone and telegraph cables, television cables, power lines, sewer and water lines, propane tanks and lines, septic systems, railroad tracks and appurtenances, and similar facilities. In the event that any utilities are damaged or broken, they shall be immediately replaced (at the Contractor's expense) to a condition conforming to the standard repair procedure of the utility.

160.02 MATERIALS

All materials used in repairing and relocating utilities shall be in accordance with the utility owner's requirements.

160.03 CONSTRUCTION REQUIREMENTS

A. NOTIFICATION - The Contractor shall be responsible for contacting the potentially affected utility agency(ies) of his construction schedule, request their assistance in making accurate locations, and shall furnish evidence of the notice to Atlantic Richfield.

B. PRIVATE UTILITIES - The Contractor shall be responsible for identifying, locating, and marking all private utilities, including but not limited to propane tanks and lines, satellite antennas and cables, and septic systems (septic tanks, leach fields and associated piping and appurtenances). This shall include interviewing property owners, probing or pitting, and such other means as are necessary to perform the locates.

C. CONFLICT WITH EXISTING UTILITIES - Where existing utilities are damaged or must be relocated, removed, or temporarily supported to allow the performance of the Work, the Contractor shall contact the utility's owner and make all arrangements and pay all costs associated with repair, relocation, removal, or temporary support of the utility. The Contractor shall comply with all requirements of the utility's owner. Utility owner shall include the property owner in the case of private utilities.

D. TEMPORARY SERVICE - Temporary service shall be provided by the Contractor during any period when utility lines are disturbed. Service of domestic water lines and sewer lines shall not be interrupted for a period of more than 6 hours, unless otherwise approved by Atlantic Richfield in writing. The Contractor shall be solely responsible for notification of those individuals affected by being out of service and for temporary connections, if needed, if the time for interruption exceeds 6 hours.

END OF SECTION 160

SECTION 201: CLEARING AND GRUBBING

201.01 GENERAL

A. DESCRIPTION - This Work shall consist of clearing, grubbing, removing, and disposing of soil, vegetation (including existing sod) and debris that may be located within residential and commercial areas specified to receive remedial action, at the North Rico (St. Louis Ponds) site borrow area (if used), and at the soil lead repository site. Prior to initiating the construction activities at residential and commercial sites in the Town of Rico, the Contractor shall request that the landowner remove any existing large debris and/or debris piles that may interfere with the work. The landowner shall be responsible for removing large debris and/or debris piles that may interfere with the Work. Clearing and grubbing shall be limited to the areas of required grading at the soil lead repository site as designated on the Drawings, in areas of required Townsite soils removal as shown on the ISWPs, or designated in the field by Atlantic Richfield. Large vegetation (i.e., trees, shrubs, hedges, etc.) and objects designated to remain shall be preserved free from injury and defacement.

If any evidence of aboriginal or historical activity or occupation is encountered during clearing and grubbing activities, the Contractor shall immediately stop work and notify Atlantic Richfield, who shall contact the proper authorities for an assessment of the significance of the resource.

The Work shall be classified as follows:

1. Clearing. Clearing shall consist of removal and disposal of unwanted brush, logs, limbs, sticks, sawdust, rubbish, debris, vegetation (including existing sod), and other objectionable matter existing within the clearing limits that interfere with the excavation. Clearing of sod shall include removal of loose, excess soil adhering to the sod mat by shaking, raking or other means to the satisfaction of Atlantic Richfield. Soil removed from clearing of sod shall be disposed of as specified in Section 220 – Townsite Soils Disposal of these Technical Specifications.

2. Grubbing. Grubbing shall consist of the removal and disposal of stubs, rock, roots, debris, and other objectionable matter from the grubbing limits. Grubbing shall include removal of loose, excess soil adhering to the shrub or tree roots by shaking, raking or other means to the satisfaction of Atlantic Richfield. Soil removed from grubbing of shrub or tree roots shall be disposed of as specified in Section 220 – Townsite Soils Disposal of these Technical Specifications.

SECTION 201: CLEARING AND GRUBBING

201.01 GENERAL

A. DESCRIPTION - This Work shall consist of clearing, grubbing, removing, and disposing of soil, vegetation (including existing sod) and debris that may be located within residential and commercial areas specified to receive remedial action, at the North Rico (St. Louis Ponds) site borrow area (if used), and at the soil lead repository site. Prior to initiating the construction activities at residential and commercial sites in the Town of Rico, the Contractor shall request that the landowner remove any existing large debris and/or debris piles that may interfere with the work. The landowner shall be responsible for removing large debris and/or debris piles that may interfere with the Work. Clearing and grubbing shall be limited to the areas of required grading at the soil lead repository site as designated on the Drawings, in areas of required Townsite soils removal as shown on the ISWPs, or designated in the field by Atlantic Richfield. Large vegetation (i.e., trees, shrubs, hedges, etc.) and objects designated to remain shall be preserved free from injury and defacement.

If any evidence of aboriginal or historical activity or occupation is encountered during clearing and grubbing activities, the Contractor shall immediately stop work and notify Atlantic Richfield, who shall contact the proper authorities for an assessment of the significance of the resource.

The Work shall be classified as follows:

1. Clearing. Clearing shall consist of removal and disposal of unwanted brush, logs, limbs, sticks, sawdust, rubbish, debris, vegetation (including existing sod), and other objectionable matter existing within the clearing limits that interfere with the excavation. Clearing of sod shall include removal of loose, excess soil adhering to the sod mat by shaking, raking or other means to the satisfaction of Atlantic Richfield. Soil removed from clearing of sod shall be disposed of as specified in Section 220 – Townsite Soils Disposal of these Technical Specifications.

2. Grubbing. Grubbing shall consist of the removal and disposal of stubs, rock, roots, debris, and other objectionable matter from the grubbing limits. Grubbing shall include removal of loose, excess soil adhering to the shrub or tree roots by shaking, raking or other means to the satisfaction of Atlantic Richfield. Soil removed from grubbing of shrub or tree roots shall be disposed of as specified in Section 220 – Townsite Soils Disposal of these Technical Specifications.

3. Disposal. Disposal shall consist of removing and disposing of the refuse accumulations from clearing and grubbing operations as approved by Atlantic Richfield. The refuse resulting from these operations shall be disposed of as described below:

a. Burning. Burning of combustible refuse at the soil lead repository site will be allowed subject to the Contractor acquiring all necessary regulatory permits and approvals. Contractor shall provide a burn plan to Atlantic Richfield for review at least 7 days prior to any planned burn. The number of burn events shall be minimized. Burial or burning of materials on-site within the Town of Rico will not be allowed.

b. Sod Disposal. Sod disposal shall be as specified in Subsection 220 - Townsite Soil Disposal of these Technical Specifications.

c. Salvaging. Any materials denoted to be salvaged shall be carefully moved and stockpiled in the areas designated by Atlantic Richfield. Salvaged materials are not to be used by the Contractor in the course of his work. Salvaged materials or resources are not the property of the Contractor.

d. Off-Site Disposal. Any unusable and/or non-combustible materials (excluding excavated sod which shall be disposed of as specified in Section 220 of these Technical Specifications) not designated for salvaging shall be hauled and disposed of at a permitted off-site disposal area at no additional cost. Such materials shall not be disposed of at the soil lead repository site.

201.02 MATERIALS

NONE.

201.03 CONSTRUCTION REQUIREMENTS

A. GENERAL - Clearing and grubbing shall be done at times and in a manner that the surrounding vegetation, adjacent property, and anything designated to remain shall not be damaged. Dragging, piling, disposing of debris, and other work that may be injurious to existing vegetation shall be confined to areas that carry no vegetation or that will be covered or disturbed by excavations.

Vegetation adjacent to areas designated to be disturbed shall be preserved and protected from injury unless the vegetation conflicts with construction operations and is designated by Atlantic Richfield to be removed. If any vegetation designated to be preserved becomes damaged or destroyed by the

Contractor, it shall be replaced to the satisfaction of Atlantic Richfield at no additional cost.

Atlantic Richfield will designate trees, shrubs, plants, or other objects that are to remain. The Contractor shall preserve all objects so designated.

The Contractor shall not injure trees, shrubbery, vines, plants, grasses, and other vegetation growing outside of the limits of excavation and embankment. The Contractor shall paint all cut or scarred surfaces of trees or shrubs selected for retention. The paint shall be an approved asphaltum base paint prepared especially for tree surgery.

B. CLEARING - All areas within the neat lines of cut or fill areas at the soil lead repository site, areas from which borrow will be removed at the North Rico (St. Louis Ponds) site, and areas designated for soil removal or cover at Townsite properties shall constitute the clearing limits.

Unless specifically designated to be saved, all trees, stumps, brush, logs, and other objectionable matter occurring within clearing limits shall be cut off and disposed of. All stumps within the clearing limits and all trees, the stumps of which are not to be grubbed, shall be cut at a height no greater than the diameter of the stump, and in any instance not more than 12 inches above the ground.

The refuse resulting from the clearing operation shall be removed and disposed of as specified herein. In no case shall any unwanted material be left on the site, moved onto adjacent private properties, or be buried in embankments on the project.

C. GRUBBING - All areas within the neat lines of the disturbance limits shall also constitute the grubbing limits.

All stumps, roots, logs, or other timber more than 3 inches in diameter, and all brush, matted roots, rock, and other debris within the grubbing limits shall be pulled or otherwise removed.

All material resulting from the grubbing operations shall be disposed of as specified herein. All depressions below subgrade, or below the final surface of the ground resulting from the grubbing operations shall be backfilled with suitable material (growth medium in areas to be revegetated or unclassified backfill otherwise) as specified in Section 202 – Residential Yard/Commercial Lot Excavation and Backfill and Section 203 – Soil Lead Repository Earthwork.

END OF SECTION 201

SECTION 202: RESIDENTIAL YARD/COMMERCIAL LOT EXCAVATION AND BACKFILL

202.01 GENERAL

A. DESCRIPTION - All residential/commercial excavation and backfill work shall be in accordance with these Specifications and in conformity with the lines, grades, and depths shown on the Drawings or as established in the field by Atlantic Richfield Company.

1. Excavation. This work shall consist of performing all operations necessary to excavate, grade, and satisfactorily remove for disposal all soil materials encountered during excavation of the residential areas designated on the Drawings (including Individual Site Work Plans or ISWPs). The Work, as designated on the Drawings or as directed by Atlantic Richfield, shall include unpaved driveway, parking area and/or walkway excavation, vegetable garden excavation, excavation of yard soils, bare play areas, any general unclassified excavation, and all other excavation not covered under other sections of these Technical Specifications. Depth of excavation shall be measured from below the existing sod cover, where applicable. The excavation depth shall typically be 12-inches unless directed otherwise by Atlantic Richfield. In areas beneath aspen trees or in aspen thickets, in areas close to obstacles (such as in the vicinity of fences, foundations, the roots of other trees, shrubs, hedges, etc.), and in areas where bedrock or coarse-grained alluvial/colluvial soils are encountered before the otherwise required depth of excavation is reached (as determined by Atlantic Richfield Company), the excavation shall be completed as shown on the Drawings.

2. Backfill. This work shall consist of all operations necessary to replace, grade and complete surface preparations in the areas excavated during residential/commercial soils removal. The Work, as designated on the Drawings, shall include driveway, parking area and/or walkway backfill (excluding aggregate and rock mulch surface materials, which are specified in Section 820 of these Technical Specifications), vegetable garden backfill, backfilling yard, bare play area excavations, and all other backfilling or embankment not covered under other sections of these Technical Specifications.

3. Visible Marker and Weed Barrier. This Work shall consist of placing visible marker or weed barrier material on excavated subgrade surfaces prior to backfilling as specified herein and as shown on the Drawings.

B. SUBMITTALS - The Contractor shall provide the following submittals:

1. Moisture-density characteristics using AASHTO T-99 (Standard Proctor) for backfill embankment materials specified to be installed in driveway and walkway areas that may be subject to compaction specifications. If material types change during construction, additional moisture-density characteristics may be required.

2. Manufacturer's catalog cut sheets and/or technical data sheets, and production lot test results, if requested by Atlantic Richfield, for visible marker and weed barrier materials to be placed in the Work.

3. Results of soil suitability testing as required in paragraph 202.01C below.

C. REFERENCE STANDARDS AND TESTING

1. Soil Density. Maximum density shall be determined by AASHTO T-99. Other standards shall be noted herein.

2. Soil Suitability as Plant Growth Medium. Suitability criteria for the parameters specified in subsequent sections shall be tested in accordance with the analytical procedures in Table 202-1. Exceptions to these recommended procedures will only be made at the specific authorization of Atlantic Richfield.

Table 202-1 - Soil Parameters - Analytical Procedures

Topsoil	Reported As	Extractant	Analytical Procedure
pH	Hydrogen ion activity	USDA Handbook 60, method (2), pg. 84 (saturated paste).	USDA Handbook 60, method (21a), pg. 102
EC (Conductivity)	mmhos/cm @ 25 c	USDA Handbook 60, method (3a), pg. 84.	USDA Handbook 60, method (3a), pg. 84 and method (4b), pg. 89-90
Saturation	Percent		USDA Handbook 60, method (27a) or (27b), pg. 107.
Particle Size Analysis	% clay, silt, sand, and very fine sand (vfs=0.05-0.1 mm)		Particle size Analysis ASA Mono. No. 9, Pt. 1 method 43-5, pgs. 562-566. Sieve analysis for very fine sand.
Texture	USDA textural class		USDA Handbook 18, pgs. 205-223.
Soluble Ca, Mg, and Na	meg/l	USDA Handbook 60, method (3a), pg. 84.	USDA Handbook 60, method (3a) pg. 84. Analysis by AA or ICP.
Sodium absorption ratio	SAR Calculated from soluble Ca, Mg, and Na concentrations		Calculated: USDA Handbook 60, pg. 26.
Carbonates	Percent		USDA Handbook 60, method (23c) pg. 105.
Lead	ppm (mg/kg)		Analysis by ICP or laboratory-grade XRF
Coarse Fragment	Percent		USDA Handbook 436, App. I, Pg. 472. SCS (1972) pgs. 9 & 12-13

202.02 MATERIALS

A. BACKFILL SOILS MATERIALS - Suitable backfill materials for residential/commercial soils replacement shall be excavated and processed as necessary from the available borrow source at the North Rico (St. Louis Ponds) site approximately 0.75 mile north of Rico (as shown on the Drawings) or any other approved borrow area meeting all backfill soils materials requirements in this Specification. See also Section 205 of these Technical Specifications for other requirements for the borrow area at the North Rico site. Two types of backfill soils, growth medium and unclassified backfill, are required as specified in the following subsections.

1. Growth Medium. Backfill materials that are to be revegetated (including soils to be placed in vegetable gardens) as indicated on the Drawings and/or ISWPs shall meet the following suitability criteria:

   a. Texture and Coarse Fragments. Meet or exceed the minimum texture and coarse fragment standards in Table 202-1.

   b. Chemical Characteristics. Meet the suitability critieria for potentially toxic forming materials as identified in Table 202-1.

   c. Suitability Testing. Meet suitability criteria for key chemical constituents identified in Table 202-2 that may be limiting to plant establishment and growth, are potentially toxic forming, or are otherwise unsuitable.

Table 202-2 - Suitability Criteria for Plant Growth Medium

Parameter	Suitable	Marginal[1]	Unsuitable
pH	5.5-8.5	5.0-5.5 8.5-9.0	<5.0 >9.0
EC (Conductivity) mmhos/cm	0-8	8-12	>12
Saturation Percentage	25-80	<25	>80
Texture		c, sic, s	
SAR[2]	0-10	10-12[3] 10-15	>12 >15
Selenium	<0.3 ppm	>0.3-0.8 ppm$_4$	
Boron	<5.0 ppm		>5.0 ppm
Coarse Frag (% vol)	<25	25-35	>35

[1]Soils evaluated by Atlantic Richfield on an individual basis for suitability.

[2]As an alternative to SAR calculations, ESP (exchangeable sodium percentage) can be determined. ESP should be determined if suitable SAR value is exceeded.

[3]For fine textured soils (clay >40%)

   c. Fertility Criteria. The upper portion of backfill soils that are to serve as plant growth medium shall also meet the soil fertility criteria that are specified in Section 320 of these Technical

Specifications, in accordance with the following depth schedule:

(1) Areas to be sodded: Top 4 inches (minimum)
(2) Areas to be seeded: Top 6 inches (minimum)
(3) Vegetable gardens: Full 18 inches depth

2. Unclassified Backfill. Backfill in areas that are not to be revegetated shall be natural mineral soil acceptable to Atlantic Richfield and shall meet the following requirements:

- Maximum particle size – 2 inches (longest dimension)
- Minimum of 25 percent passing the No. 4 U.S. Standard Sieve

3. Detrimental Materials. Stumps, roots, rubbish, vegetation, frozen lumps, concrete, rebar, or other unsuitable materials will not be accepted in any backfill soils.

4. Backfill Soil Lead Concentration. Total lead concentration in all backfill soils shall be less than or equal to 400 ppm (mg/kg). Testing of borrow areas other than the pre-approved borrow area at the North Rico (St. Louis Ponds) site shall be at a frequency of one test per 200 cy of borrow removed or planned for removal. Upon sufficient testing of a given borrow area as determined by Atlantic Richfield to demonstrate that the source will meet the total lead criterion, the testing frequency may be reduced or the testing requirement waived.

B. AGGREGATE SURFACING MATERIALS - Requirements for driveway, parking area, walkway, and other top surfacing materials are specified under Section 820 - Aggregate and Rock Mulch Surface Materials, of the Technical Specifications.

C. EXCAVATED SOIL MATERIAL - Soils that are removed from residential yards, commercial lots, or other areas shall be hauled and disposed at the soil lead repository to be constructed as part of the Work in accordance with the requirements of Section 220 – Townsite Soil Disposal and other relevant sections of these Technical Specifications.

D. VISIBLE MARKER – Visible marker materials shall be placed on the excavated subgrade in areas of Townsite soil removal prior to placing backfill. The type of visible marker material at a given location shall be as indicated on the Drawings. Visible marker materials shall be of two types as follows:

1. Geotextile. Visisble marker geotextile shall be Mirafi® 135N or LINQ® 125EX fabric composed of nonwoven, needle-punched polypropylene of unit weight not less than 3.2 oz/yd^2, or approved equal.

2. Geogrid. Visible marker geogrid shall be Enkagrid® MAX 20 or Mirafi® BasXgrid 11 composed of biaxial woven polypropylene or polyester with nominal aperture size not less than 1-inch x 1-inch, or approved equal.

E. WEED BARRIER – Weed barrier, also known as "greenhouse plastic", shall be UV-protected polyethylene sheeting of minimum 6 mil thickness.

202.03 CONSTRUCTION REQUIREMENTS

A. GENERAL - All excavation shall be considered unclassified and shall consist of the removal and disposal of any and all material encountered regardless of type or nature obtained within the construction limits designated on the Drawings (including ISWPs).

All materials removed from excavation areas shall be hauled and disposed at the designated location(s) as described above.

B. SITE PREPARATION - All areas scheduled for excavation and embankment shall be video recorded and photographed (by Atlantic Richfield or other representative designated by Atlantic Richfield) to document initial site conditions. The Contractor shall not begin excavation work until receiving written verification from Atlantic Richfield that a yard/lot has been adequately videotaped and/or photographed. Video recordings and photographs shall include distance and close-up shots of the house, garage(s), siding conditions, yard, fences, sidewalks and driveways. As-built construction drawings and photo/video records shall be maintained. Prior to excavation, all buried utilities shall be located and marked, fences removed (as necessary), tree and shrub protection provided, structure and landscaping protection provided and construction staking completed.

C. LINE AND GRADE CONTROL - Prior to excavation, backfill, grading, and embankment operations, the Contractor shall verify that an adequate number of occupation markers (installed by others) are in place to define the construction limits. Contractor shall perform construction surveying, including construction staking as necessary to control the Work. All construction stakes shall be maintained, to the extent practical, for reference throughout the construction period. At a minimum, a sufficient number of construction stakes shall be maintained throughout the work to permit verification of the excavation work within the depth tolerances specified.

D. EXCAVATION

1. General. The Contractor shall utilize excavating equipment appropriate for the work being performed. The method of excavation shall be the Contractor's responsibility. All methods and equipment used shall result in finished work meeting the construction tolerances specified. No work shall be performed beyond the construction limits without prior written approval from the Landowner and Atlantic Richfield.

2. Obstacles. In areas where excavation is required in the vicinity of large vegetation (e.g., trees) specified to remain in-place, in areas of aspen trees, or adjacent to obstacles (e.g., fences, foundations, patios, etc.), the excavation shall be completed as shown on the Drawings. Excavation shall be completed by hand methods in areas of aspen trees and rooting areas and within 12 inches of obstacles, and cover soil shall be applied and wetted over exposed roots as soon as possible following excavation activities.

   Contractor shall notify Atlantic Richfield immediately if areas are encountered where shallow bedrock or coarse-grained alluvial or colluvial soils are encountered before reaching otherwise required excavation depths. The required depth of excavation in such areas will be determined by Atlantic Richfield, but in no case will the depth be greater than otherwise required as shown on the Drawings.

   Excavation over known or suspected septic system leach fields shall be preceded by probing to determine the approximate depth to the top of the leach field. A plan for excavating and/or backfilling over any such areas shall be developed and presented for review and comment by Atlantic Richfield prior to commencing work.

E. VISIBLE MARKER INSTALLATION – Visible marker geotextile and geogrid shall be placed in general accordance with the manufacturer's recommendations and as approved by Atlantic Richfield. The following practices shall also be implemented:

1. Overlap adjacent pieces of geogrid or geotextile a minimum of 12 inches or more as necessary to ensure continuous coverage after backfilling.

2. Staples or stakes shall be used as necessary to hold the geotextile or geogrid in place during installation, and shall be driven approximately flush with the subgrade before placing backfill.

3. Care shall be taken not to puncture, tear, rupture or displace the geotextile or geogrid during backfilling.

4. No traffic shall be allowed on the geotextile or geogrid until at least 6 inches of backfill has been placed.

5. Any punctures or tears noted during installation of visible marker geotextile shall be repaired by placing a piece of the same geotextile over the damaged area before placing or replacing backfill. All dimensions of the repair patch shall be at least three times the maximum dimension of the damaged area, and not less than 24 inches in any dimension.

6. Geotextile and geogrid shall be stored in a safe and secure manner, covered or out of direct sunlight, until placed.

F. WEED BARRIER PLACEMENT – Weed barrier ("greenhouse plastic") shall be placed in a workmanlike manner to ensure complete coverage and avoid tearing, puncturing or displacement of the barrier during backfilling. Guidelines specified above for Visible Marker installation shall also apply to Weed Barrier Placement. At Contractor's option, two or more layers of barrier may be placed to minimize the need to repair or replace damaged areas of barrier. Repairs, if needed, shall be performed as required above for visible marker materials.

G. SOIL REPLACEMENT

1. Obtaining Backfill. Suitable backfill shall be obtained at the site(s) identified in Section 202.02 above. Any backfill soil materials temporarily stockpiled by the Contractor shall be rehandled and placed without additional compensation. The sites of all stockpiles and areas adjacent thereto which have been disturbed by the Contractor shall be graded, if required, and returned to a condition acceptable for seeding or sodding if/as directed by Atlantic Richfield.

2. Placing Backfill. After excavation and depth verification has been completed, the replacement soils shall be deposited and evenly placed on the subgrade in lifts not to exceed 6-inches in depth. Replacement backfill shall not be applied when the ground or replacement soil is frozen, excessively wet, or otherwise in a condition detrimental to the Work. Minimal compaction will be performed using proposed method(s) approved by Atlantic Richfield. Any large, stiff clods and hard lumps of soil shall be broken with a pulverizer or other effective means, and all stones or rocks (2-inches or greater in diameter), roots,

litter or foreign material shall be raked up and disposed of by the Contractor.

In areas where the depth of excavation is shallower than otherwise specified or shown on the Drawings due to the presence of shallow bedrock or coarse alluvial/colluvial soils, Atlantic Richfield may direct that backfill depths shallower than otherwise specified or shown on the Drawings be placed to maintain pre-existing site drainage or to match or transition to adjacent grades.

3. Compaction. In backfill embankment areas subject to compaction specifications (e.g., driveways, parking areas and walkways to be overlain with surface aggregate) the backfill soils shall be deposited and evenly placed on the subgrade in lifts not to exceed 6-inches in depth. The backfilled materials shall be compacted using appropriate compaction equipment to attain 95% of Standard Proctor density, at –3 to +3 percent of optimum moisture content. Compaction shall be performed in a manner that does not disturb adjacent structures (e.g., concrete sidewalks, foundations, buildings, trees, shrubs, hedges, etc.). Any damage to adjacent structures caused during compaction activities, shall be repaired by the Contractor at his own expense. Compaction specifications are further discussed in Subsection 820 – Aggregate and Rock Mulch Surfacing Materials of these Technical Specifications.

4. Finish Grading. Following backfill of the excavations with replacement soil (and compaction where specified), the backfill shall be brought to lines, grades, and cross-sections shown on the Drawings so that the final surface following placement of growth media/topsoil and sod or aggregate/rock mulch will match the surrounding topography. Where specific grades have not been established, the areas shall be smooth graded and the surface left at the prescribed grades in an even and properly compacted condition to prevent, insofar as practical, the formation of low areas or pockets where water will stand and to facilitate positive drainage away from buildings.

H. CLEAN-UP

The Contractor shall remove all tools, equipment, excess materials, debris, etc. from the vicinity of the work.

END OF SECTION 202

SECTION 203: SOIL LEAD REPOSITORY EARTHWORK

203.01 GENERAL

A. DESCRIPTION - This Work shall consist of excavating subgrade, furnishing and placing soil, rock and man-made materials associated with construction of the Soil Lead Repository, including, but not limited to structural fill, liner and cover components, waste materials, and riprap erosion and filter protection. Specifications for GCL liner are provided separately in Section 204 of these Technical Specifications.

B. SUBMITTALS - The following submittals are required unless noted otherwise:

- Gradation(s) and soil classifications of all specified materials.
- Standard Proctor moisture-density test results for compacted materials.
- Manufacturer's literature, certifications, and batch testing on manufactured materials.

C. REFERENCE STANDARDS - American Society for Testing and Materials (ASTM) Standards, most recent edition, Standard Test Methods for:

- D 422 - Particle Size Analysis of Soils
- D 698 - Laboratory Compaction Characteristics of Soil Using Standard Effort
- D 1140 - Amount of Material in Soils Finer Than the No. 200 (75-μm) Sieve
- D 1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort
- D 2487 - Classification of Soils for Engineering Purposes
- D 2488 - Description and Identification of Soils (Visual-Manual Procedure)
- D 4833 - Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products

203.02 MATERIALS

A. TYPE A FILL – To be installed compacted in repository foundation and stability berms and all other areas on the Drawings where fill type is unspecified. Material shall be compacted fill derived from excavations or borrow areas identified on the Drawings and shall be free of frozen materials, organics, trash, debris, and other deleterious substances.

B. TYPE B LINER CUSHION – To be installed beneath GCL liner materials as compacted fill. Material shall be free of frozen materials, organics, trash,

debris and other deleterious substances. Material may be derived from borrow areas specified on the Drawings or from off-site sources or suppliers and processed as necessary to meet requirements specified herein.

1. General. Materials shall consist of smoothly- and well-graded ¾-inch minus SC/SM (clayey or silty sand) to GC/GM (clayey or silty gravel materials). Off-site borrow sources, if used, shall be pre-approved by Atlantic Richfield and shall be chemically compatible with GCL liner materials (see separate specification Section 204). Prepare final surface in accordance with GCL manufacturer's specifications and recommendations.

2. Gradation. Type B Liner Cushion shall meet the following gradation requirements:

Sieve Size	Percentage (by Weight) Passing Square Mesh Sieves
3/4"	100
No. 4	60 - 85
No. 40	30 - 60
No. 200	20 - 40

C. TYPE C DRAIN – To be installed over GCL liner materials as lightly compacted fill. Material shall be free of fines, coatings of fines, frozen materials, organics, trash, debris and other deleterious substances.

1. GENERAL - Materials shall consist of well-graded ¾-inch minus clean, washed, coarse sand and fine gravel.

2. GRADATION – Type B Liner Cushion shall meet the following gradation requirements:

Sieve Size	Percentage (by Weight) Passing Square Mesh Sieves
3/4"	100
3/8"	0-100
No. 4	0-20
No. 8	0-1

D. TYPE D INFILTRATION REDUCTION LAYER – A minimum of 2,200 cy of uncompacted Type D material shall be stockpiled in the stockpile area shown on the Drawings for use in final closure (by others). Material installation in the repository is not included in this Contract. Material shall be free of organics, trash, debris and other deleterious substances.

1. General. Materials shall meet the same specification requirements as TYPE B LINER CUSHION specified above unless noted otherwise. Grade stockpile subgrade area flat and stockpile in a manner to minimize footprint area. An additional 6 inch (in addition to quantities listed above) sacrificial layer of TYPE D INFILTRATION REDUCTION LAYER shall be provided and placed beneath the stockpile to allow for waste during future excavation.

E. TYPE E GROWTH MEDIA – To be installed over TYPE A FILL and in other areas as specified on the Drawings. Material shall meet the requirements of GROWTH MEDIUM specified in Section 202.02, Part A, Section 1. Seed ditches receiving TYPE E GROWTH MEDIA with "Native Lawn" mix specified in Section 320 and all other areas with "Native Yard" mix specified in Section 320.

F. TYPE F RIPRAP – To be installed as uncompacted erosion protection in Type 1, 2, and 3 Channels as indicated on the Drawings. Material shall be free of fines, coatings of fines, frozen materials, organics, trash, debris and other deleterious substances.

1. General. Materials shall consist of hard, durable, subangular to angular rock. Provide a minimum 9-inch uncompacted lift.

2. Gradation. Type F Riprap shall meet the following gradation requirements:

Stone Weight (lb)	Percentage Lighter by Weight
2-5	15
7-10	50
13-33	100

G. TYPE G DRAIN GRAVEL – To be installed around perforated and non-perforated HDPE pipe where pipe overlies GCL liner as indicated on the Drawings. Material shall be free of fines, coatings of fines, frozen materials, organics, trash, debris and other deleterious substances.

1. General. Materials shall consist of hard, durable, clean, washed fine gravel.

2. Gradation. Type G Drain Gravel shall meet the following gradation requirements:

Sieve Size	Percentage (by Weight) Passing Square Mesh Sieves

3/4"	100
3/8"	0-1

H. TYPE H FILTER SAND – To be installed as compacted erosion protection in Type 3 Channels as indicated on the Drawings. Material shall be free of fines, coatings of fines, frozen materials, organics, trash, debris and other deleterious substances.

1. General. Materials shall meet the same specification requirements as TYPE C DRAIN specified above unless noted otherwise. Provide a minimum 6-inch compacted lift.

I. TYPE I FILL – To be installed as compacted fill to protect liner components from damage and erosion. Material shall be free of frozen materials, organics, trash, debris and other deleterious substances.

1. General. Materials shall meet the same specification requirements as TYPE A FILL specified above or WASTE MATERIALS specified below unless noted otherwise. Excess quantities of TYPE C DRAIN and TYPE G DRAIN GRAVEL specified above may be used if authorized by Atlantic Richfield. Materials shall be placed in a timely manner to protect liner components.

J. WASTE MATERIALS – To be installed as compacted fill over TYPE C DRAIN or TYPE I FILL. Material shall only be derived from the Townsite soil removal activities and shall be free of sod, tree stumps, branches and other organic materials greater than 1.0 inches in diameter, construction and man-made materials, trash, debris and other deleterious substances.

1. General. Install and complete PHASE I STABILITY BERM and fill as necessary to provide drainage to stormwater facilities prior to placement of any PHASE II WASTE indicated on the Drawings. If removed soil waste material quantities are sufficient, place PHASE II waste in uniform horizontal lifts that maintain the 2% and 10% drainage slopes shown on the Drawings. Maintain positive drainage to stormwater facilities shown on the Drawings at all stages of construction.

J. FILTER FABRIC – Fabric to be installed over subgrade to provide filter protection in Type 1, 2 and 3 Channels as shown on the Drawings. Uncompacted TYPE H FILTER SAND may be substituted for FILTER FABRIC at Contractor's option.

1. General. Provide submittals for Contractor-selected materials recommended by manufacturer as suitable for use as filter fabric

beneath riprap. Materials are subject to approval by Atlantic Richfield and shall be heavy-weight synthetics with a minimum ASTM D4833 Puncture Strength of 160 pounds.

2. Subgrade Preparation And Placement. Unless TYPE H FILTER SAND is substituted for FILTER FABRIC, remove all stones greater than 1-inch, and all other projections capable of puncturing filter fabric. Install according to manufacturer's recommendations for riprap filter fabric application.

3. Clean-up. Trim and/or cover with a minimum of 6 inches of approved material all excess and/or visible fabric.

203.03 CONSTRUCTION REQUIREMENTS

A. GENERAL - Immediately prior to placing materials, the subgrade shall be smooth and shaped and free of loose rocks larger than 1-inch, rocks protruding more than 1-inch above subgrade, debris, trash and other materials not consisting of excavated subgrade or previously placed materials meeting specification requirements. All subgrade shall compacted and be free of wet, muddy or frozen areas.

The material shall be mixed and placed in horizontal layers of not more than 6-inches loose thickness, except as allowed by Atlantic Richfield or specified otherwise. Natural or excavated subgrade and all materials specified above as compacted shall be moisture conditioned and compacted to attain 95% of Standard Proctor Density at $\pm$ 3% of Optimum Moisture Content.

Hauling over the subgrade will not be permitted at such times and in such manner as to be detrimental to the subgrade. The material shall be deposited and spread in a uniform layer without segregation of size to such loose depth that when compacted, the layer will have the required thickness. Spreading shall be as necessary to distribute the material in a uniform layer.

Material placed shall be compacted to the full width by rolling with approved equipment. Any irregularities or depressions that develop under rolling shall be corrected by loosening the material in these places and adding or removing material, as the case may require, until the surface is smooth and uniform.

Spreading and compacting shall be performed alternately as required to maintain a smooth, even, uniformly compacted surface until the final inspection. Along structures and at all places not accessible to the roller, the surfacing course material shall be tamped thoroughly with approved mechanical tampers or hand tampers to obtain a density conforming to the compaction requirements.

END OF SECTION 203

SECTION 204: SOIL LEAD REPOSITORY LINER

204.01 GENERAL

A. DESCRIPTION - This work shall consist of furnishing and placing Geosynthetic Clay Liner (GCL) associated with construction of the Soil Lead Repository.

B. SUBMITTALS - The following submittals are required unless noted otherwise:

- Manufacturer's literature, certifications, and batch testing on man-made materials.

C. REFERENCE STANDARDS - American Society for Testing and Materials (ASTM) Standards, most recent edition, Standard Test Methods for:

- D 4833 - Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products

D. OTHER REFERENCES – Manufacturer's Installation Guidelines for Bentomat and Claymax Geosynthetic Clay Liners.

204.02 MATERIALS

A. GCL LINER – To be installed in Soil Lead Repository over TYPE B LINER CUSHION (see Specification Section 203). Provide Bentomat® DN as manufactured by CETCO, Arlington Heights, Illinois. The minimum acceptable dimensions of full-size panels shall be 13.8 feet (4.2 meters) in width and 125 feet (38 meters) in length. A 2-foot (600 mm) overlap guideline shall be imprinted on both edges of the upper geotextile fabric component of the GCL as a means for providing quality assurance of the overlap dimension. Lines shall be printed in easily visible, durable, non-toxic ink. Submit manufacturer's data to ensure the Bentomat® DN supplied meets or exceeds the following minimum average roll physical properties as determined according to the referenced standard test methods:

1. Minimum Bentonite Free Swell (USP/NF XVII): 24 mL/2g.
2. Maximum Bentonite Fluid Loss (API 13A/13B): 18 mL.
3. Bentonite Mass/Area (ASTM D 5261): 0.75 lbs/ft^2 (3.6 kg/m^2) minimum.
4. GCL Grab Strength (ASTM D 4632) (Tensile testing performed in machine direction): 150 lbs (660 N).

5. GCL Peel Strength (ASTM D 4632): 15 lbs (65 N).

6. GCL Permeability (ASTM D 5887) (Permeability with de-aired distilled water at 80 psi (551 kPa) confining pressure and 77 psi (531 kPa) head pressure): 5 x 10-9 cm/sec.

7. GCL Hydrated Internal Shear Strength (ASTM D 5321) (peak value measured at 200 psf (10 kPa) normal stress): 500 psf (24 kPa) typical.

Each roll shall be labeled prior to shipment to identify the product identification information (manufacturer's name and address, brand name, product code), lot number, roll number, roll length, roll width, and roll weight.

All rolls shall be labeled and bagged in packaging that is resistant to ultraviolet light.

B. GRANULAR BENTONITE – To be installed as a seal between GCL liner materials and appurtenances penetrating the liner including pipes and manholes and GCL patch and overlap areas. Provide coarse-ground, granular sodium bentonite suitable for sealing between GCL and structures where structures penetrate liner and patched and roll overlap areas per referenced manufacturer's recommendations. Granular bentonite shall be from natural sodium bentonite (Volclay or equal) and shall have granules no larger than 2.0 mm. Protect granular bentonite from premature hydration prior to installation.

204.03 CONSTRUCTION REQUIREMENTS

A. Follow manufacturer's installation guidelines for roll handling methods, equipment and installation procedures.

B. Visually inspect each roll during unloading to identify if any packaging has been damaged. Mark rolls with damaged packaging, and set aside for further inspection. Repair damaged packaging prior to placing rolls in storage.

C. Store GCL rolls on level, dry and well-drained areas. Rolls should be stored in a manner that prevents sliding or rolling from the stacks. Protect stored GCL materials and granular bentonite from moisture.

D. Preserve the integrity and legibility of the labels during storage.

E. Remove original packaging immediately prior to deployment. Unless otherwise specified, install the GCL such that the product name printed on one side of the GCL faces up.

F. Do not drag GCL across the subgrade; utilize a slipsheet per manufacturer's recommendations.

G. Place GCL so that seams are parallel to the direction of sloping subgrades. All GCL panels should lie flat on the underlying surface, with no wrinkles or folds, especially at the exposed edges of the panels.

H. Place only as much GCL as can be covered at the end of the working day with soil cover. Do not leave GCL uncovered overnight. If the GCL is hydrated when no confining stress is present, remove and replace the hydrated material. Notify Atlantic Richfield if premature hydration occurs.

I. Construct GCL seams with granular bentonite-enhanced, overlapping adjacent edges. Ensure that the overlap zone is not contaminated with loose soil or other debris. Construct bentonite enhanced seams by overlapping adjacent panels, exposing the underlying edge, and applying a continuous bead of granular sodium bentonite along a zone defined by the edge of the underlying panel and the 2-foot (600 mm) line at a rate of one-quarter pound per lineal foot (0.4 kg/m).

J. The minimum dimension of the longitudinal overlap shall be 2 feet (600 mm). End-of-roll overlapped seams should be similarly constructed with a minimum, bentonite-enhanced overlap of 2 feet 6 inches (750 mm).

K. Seal the GCL around the penetrating pipes and manholes per manufacturer's guidelines. Utilize secondary GCL collars.

L. Repair GCL that is damaged (torn, punctured, perforated, etc.) during installation by cutting a patch to fit over the damaged area. Cut the patch to size such that a minimum overlap of 2 feet (600 mm) is achieved around the damaged area. Spread granular bentonite around the damaged area prior to placement of the patch, in accordance with Paragraph I above.

END OF SECTION 204

SECTION 205: NORTH RICO (ST. LOUIS PONDS) SITE BORROW AREAS

205.01 GENERAL

A. DESCRIPTION - This Work shall consist of excavation, operation and closure of borrow areas designated on the Drawings, including any processing of excavated materials necessary to meet materials specifications in other sections of these Technical Specifications.

B. SUBMITTALS - The following submittals are required:

- Copies of any applicable Federal, State, and Local permits for borrow area operations.
- Borrow Excavation Plans

205.02 MATERIALS

NONE.

205.03 CONSTRUCTION REQUIREMENTS

A. BORROW EXCAVATION PLANS – Submit excavation plans for approval by Atlantic Richfield for borrow areas shown on the Drawings (Primary and Secondary Borrow Areas), if utilized, at least two weeks prior to excavation. Designate a stockpile area for stripped topsoil. Excavation plans should include anticipated borrow limits, depth of excavation, anticipated excavation slopes, provisions for maintaining access on existing roads and trails, location of any processing operations, proposed haul routes, and safety procedures. Areal disturbance for the Primary Borrow Area shall be minimized. The Secondary Borrow Area is located in a known landslide area and may be locally underlain by buried demolition debris from previous operations at the St. Louis Ponds site (refer to Engineering Design and Operations Report); thus, depths of excavation shall be minimized in this area. Final slopes in the disturbed area of either Borrow Area shall not exceed 3H:1V. Resubmit modified Borrow Excavation Plans for approval as necessary if operation plans change.

B. TOPSOIL SALVAGE – Strip and stockpile topsoil in designated area identified in Contractor's approved Borrow Excavation Plan(s). Provide a smooth, uniform grade upon completion of borrow operations. Leave all stripped and stockpiled topsoil for use by Atlantic Richfield. Reclamation of borrow areas is not part of this contract.

C. COORDINATION WITH OTHER SITE ACTIVITIES – Contractor shall cooperate fully with Landowner, Landowner's lessee, and Atlantic Richfield

so as to minimize to the maximum extent practicable interference with any operations by Landowner's lessee during the period of construction.

END OF SECTION 205

SECTION 206: DRAINAGE SYSTEMS

206.01 GENERAL

A. DESCRIPTION - This Work shall consist of furnishing and installing drainage systems associated with construction of the Soil Lead Repository, including, but not limited to: Drainage piping, fittings, and accessories; Storm Drainage Structures, and Surface Drains.

B. SUBMITTALS - The following submittals are required:

- Product data, including installation procedures and product specifications for all materials.
- Independent third party certification or test report demonstrating conformance to applicable pipe specifications, before pipe is installed, for the following: Structural Performance, Material Performance, and Joint Performance.

C. REFERENCE STANDARDS

a. American Association of State Highway and Transportation Officials (AASHTO)
   i. AASHTO HB Section 17 – Soil-Thermoplastic Pipe Interaction System
   ii. AASHTO HB -Section 30 – Thermoplastic Pipe
   iii. AASHTO M252 – Corrugated Polyethylene Drainage Pipe

b. American Society for Testing and Materials (ASTM)
   i. ASTM A185 – Steel Welded Wire Reinforcement, Plain, for Concrete
   ii. ASTM A536 – Ductile Iron Castings
   iii. ASTM A615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
   iv. ASTM C151 – Test Method for Autoclave Expansion of Portland Cement
   v. ASTM C206 – Finishing Hydrated Lime
   vi. ASTM C443 – Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
   vii. ASTM C478/C478M – Precast Reinforced Concrete Manhole Sections
   viii. ASTM C877/C877M – External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections

ix. ASTM C890 – Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
x. ASTM C913 – Precast Concrete Water and Wastewater Structures
xi. ASTM C923/C923M – Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
xii. ASTM C990/C990M – Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
xiii. ASTM D1149 – Test Method for Rubber Deterioration-Surface Ozone Cracking in a Chamber
xiv. ASTM D2321 – Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
xv. ASTM F477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe

206.02 MATERIALS

A. CORRUGATED HIGH DENSITY POLYETHYLENE PIPE (HDPE) – Pipe shall comply with the requirements for test methods, dimensions, and markings found in AASHTO M252 Type S for 4" – 10" diameters or AASHTO M294 Type S for 12" – 60" diameters. As further defined and described in AASHTO M252 and AASHTO M294, the prescribed sizes of pipe are nominal inside diameters. Pipe diameter tolerance shall be 4.5 percent oversize and 1.5 percent undersize. Pipe lengths shall not be less than 99 percent of the manufacturer's stated length. Four- through 10-inch (100 through 250 mm) pipe shall be silt tight and shall be Hancor Sure-Lok F477 or pre-approved equal. Pipe supplied shall be smooth Interior and Annular Exterior Corrugated High Density Polyethylene (HDPE) Pipe meeting the requirements of AASHTO M252, Type S. The pipe supplied shall be silt tight as defined in the joint performance requirements of this specification. Virgin material for 4"- 10" Pipe and fitting production shall meet the requirements of AASHTO M252.

1. Joint Performance. Silt tight joints shall be bell-and-spigot meeting the silt tight requirements of AASHTO M252 or AASHTO M294. Silt tight joints shall meet a 2.0 psi (14kPa) laboratory test as further defined and described in the performance section of this specification. Gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.

2. Fittings. Fittings shall conform to AASHTO M252 or AASHTO M294. Fabricated fittings shall be welded on the interior and exterior at all accessible junctions.

B. STANDARD PRECAST CATCH BASIN – Standard Precast Concrete Catch Basins shall meet ASTM C478/C478M, and shall be manufactured with precast reinforced concrete. Minimum diameter shall be 48-inch.

1. Base section shall have a minimum floor slab thickness of 6 inches and shall have a minimum wall thickness of 5 inches.

2. Riser Sections shall have a minimum wall thickness of 4 inches and a minimum diameter of 48 inches. Riser lengths shall be 2 feet. Provide additional riser sections sufficient to construct riser to within five (5) feet of the top of Phase II Waste indicated on the Drawings.

3. Joint Sealant shall meet ASTM C990/C990M and shall be manufactured with bitumen or butyl rubber.

4. Pipe connectors shall meet ASTM C923/C923M, shall be resilient and shall be sized for each pipe connecting to base section. Pipe connectors shall be fitted or cast into manhole walls.

5. Precast manhole lid shall have three fabricated lifting handles installed. Handles shall be pre-approved by Atlantic Richfield. Lid shall have an opening size as indicated on the Drawings and shall be suitably reinforced.

C. CATCH BASIN GRATES – Grates shall be type W-38-4 with 3"x3/8" bearing bars spaced at 4 inches on the center. Weight per square foot shall be 22.5 lbs or better. Grates shall be designed to carry H-20 loads on a 2'-8" clear span. Open ends of grating shall be banded. Heavy duty grating shall be galvanized after fabrication.

206.03 CONSTRUCTION REQUIREMENTS

A. PIPES – For stormwater piping, install detectable warning tape directly over pipe and at outside edges of underground structures. Piping, fittings, and drainage structures shall be inspected prior to installation and any defective or damaged product shall be replaced. Install piping system as indicated herein and as directed by the product manufacturer. Where specific installation procedure is not indicated, follow product manufacturer's written instructions. Open ends shall be protected with a pipe plug to prevent earth or other material from entering the pipe during construction. The interior of the pipe shall be free from dirt, excess water and other foreign materials as the pipe laying progresses and left clean at the completion of the installation. Install piping system beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream.

Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions. Follow product manufacturer's instructions for the use of lubricants, cements, and other special installation requirements. Backfill all trenches as soon as practicable, but not later than the end of each working day.

B. PIPE BEDDING – In areas where bedding is not specified on the Drawings, a bedding material consisting of TYPE G DRAIN GRAVEL (refer to Section 203) shall be provided for the pipe and any protruding features of its joint and/or fittings. The middle of the bedding, equal to one-third of the pipe outside diameter, shall be loosely placed while the remainder shall be compacted to a minimum of 90% of maximum density per AASHTO T99. Pipe bedding shall be a minimum of 4" – 6" in thickness. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

C. CATCH BASIN INSTALLATION – Manholes and catch basins shall be installed according to the manufacturer's written instructions. Precast concrete manhole and catch basin sections shall be installed with gaskets according to ASTM C891.

END OF SECTION 206

SECTION 220: TOWNSITE SOIL DISPOSAL

220.01 GENERAL

A. DESCRIPTION - This Work shall consist of loading, hauling, and dumping of the soils excavated from Townsite yards/lots. All soils excavated shall be hauled to and properly disposed of at the soil lead repository to be constructed as part of the Work at the North Rico (St. Louis Ponds) site.

B. SUBMITTALS - The following submittals will be required:

1. Load Tickets. Copies of load tickets, manifests or other documents associated with the transport and disposal of excavated soils. At a minimum a load ticket shall be prepared for each load hauled to include the approximate volume or weight or the load, and the date and time leaving the Townsite property and arriving at the repository site.

220.02 MATERIALS

Materials for this item are covered under Construction Requirements, below.

220.03 CONSTRUCTION REQUIREMENTS

A. HAULING and STOCKPILING – Townsite yard/lot soils shall be hauled from the excavation areas using suitable haul vehicles. During transport, excavated soils shall be covered or wetted in the haul vehicle to prevent airborne emissions. Wetting shall be controlled so as not to result in drainage of free water from the haul vehicle. Proper care shall be taken to avoid spillage of soil during transport. Traffic control shall be accordance with Section 550 - Traffic Control. Transport shall be in such a manner as to be consistent with all state, county, and municipal regulations regarding health, safety, and public welfare.

B. DISPOSAL - Soils that are removed from Townsite yards/lots shall be hauled and disposed at the soil lead repository as specified in Section 220.01 above.

1. Sod Disposal. Sod and any other non-combustible organic matter removed from Townsite yards/lots shall be disposed of in the designated Stockpile Area shown on the Drawings.

2. Other Materials. No other materials, including trash, construction debris, or any other waste shall be disposed of at the soil lead repository.

C. HAUL AND ACCESS ROAD MAINTENANCE AND REPAIR – Contractor shall maintain all roads, whether paved or unpaved, used for access or materials hauling to at least the condition existing at the time of mobilization. Any damage to roads caused by Contractor's operations, as determined by Atlantic Richfield shall be repaired by Contractor to the satisfaction of Atlantic Richfield and the jurisdiction otherwise responsible for maintenance of the road.

END OF SECTION 220

SECTION 310: FENCES

310.01 GENERAL

A. DESCRIPTION - This Work shall consist of temporarily removing (where necessary, to provide access to the work area) and either resetting or constructing new fences. The types of fences to be removed and replaced will vary. Any fences that are removed by the Contractor to gain access to the work area shall be replaced using salvaged materials, or replaced using new materials that are the same type as those removed, if necessary. In any case, the reconstructed fence shall incorporate new posts, rails, and/or fabric, as appropriate, to result in a structurally sound final product of equal or better quality than the original fence. All replaced fences shall be oriented along the original alignment.

310.02 MATERIALS

Any new fencing materials shall be the same type as those temporarily removed, or as otherwise approved by the Landowner and Atlantic Richfield. Any salvaged fencing materials shall be stored and maintained in good quality throughout re-installation. Any fencing materials designated to be salvaged that are damaged as a result of the Contractor's activities, shall be replaced by the Contractor.

310.03 CONSTRUCTION REQUIREMENTS

A. CLEARING AND LEVELING FENCE LINES - Irregularities in the ground line upon which the fence is to be constructed shall be leveled to the satisfaction of Atlantic Richfield. All trees, shrubs, brush, rock, and other obstacles that interfere with proper construction of the fence shall be removed by the Contractor and disposed of in accordance with Section 201 - Clearing and Grubbing. In performing the operation of clearing and leveling, a minimum amount of terrain shall be disturbed.

B. TEMPORARY FENCE CONSTRUCTION - Erect temporary Construction Fence along removed fence alignments, as necessary, to keep pets, etc. enclosed in the residential yard area and to keep pedestrian and vehicular traffic out of the work area. Temporary fences shall remain in place only until the Work in a specific area is completed. Replace the salvaged fence materials or construct new fence as soon as practical after the necessary Work is completed. Use the minimum number of braces, panels, deadmen, and other accessories, as necessary, to maintain the temporary fence in a functional manner.

Undamaged materials used in the temporary fence that meet specifications for the permanent fence may be used as the permanent fence. Materials not used

in permanent fencing shall remain the Contractor's property. Remove all temporary fences at the Contractor's expense.

C. REMOVE AND RESET FENCE - When removing and resetting a fence, furnish all new required materials, over and above the usable salvaged fence, that are necessary to construct the fence. Use, to the extent practical, materials of the same type and quality as those of the old fence that meet the Landowner's and Atlantic Richfield's specifications.

Replace rotten, damaged, or broken posts and unusable panels with new materials. Do not use any galvanized materials with abraded or broken coatings. Carefully handle and store, at designated locations, all removed fence materials specified to be salvaged.

END OF SECTION 310

SECTION 320: ORGANIC AMENDMENTS, FERTILIZING, SODDING, SEEDING AND MULCH

320.01 GENERAL DESCRIPTION

This work consists of ground surface preparation; furnishing, applying and incorporating organic amendments; furnishing, applying and incorporating fertilizer into the soil; performing revegetation operations including the procurement and planting of suitable plant materials; mulching; and cleanup. Furnishing and planting suitable plant materials includes either transplanting sod for lawns or planting appropriate seed mixtures. For treatment areas where sod is used, the work consists of furnishing, hauling, and placing approved live sod on prepared areas in accordance with this specification. Mulching will consist of covering and processing specified treatment areas with a mulch consisting of specified materials and anchoring it in place with suitable tackifiers. The work includes the procurement, storage, maintenance, proper treatment, handling and care of all necessary supplies including organic amendments, fertilizer, suitable plant materials and mulch and tackifiers.

320.02 MATERIALS

The main categories of materials to be used in performance of this work include Organic Amendments, Fertilizer, Suitable Plant Materials, and Mulch and Tackifiers. Material definitions and specifications for their use are described in the subsections below.

A. TEST PROCEDURES - Test procedures in Table 320-1 shall be followed unless specifically authorized otherwise by Atlantic Richfield.

Table 120-1 - Analytical Procedures for Soil Fertility Assessment

Parameter	Reported As	Recommended Procedure
Nitrate-Nitrogen	ppm	ASA Mono. No. 9, Pt. 2, method 33-3.2, pg. 649. Analysis by ASA Mono. No. 9, Pt. 2, method 33-8.2, pg. 679.
Phosphorus	ppm	ASA Mono. No. 9, Pt. 2, method 29-3.5.2, pg. 570.
Potassium	ppm	ASA Mono. No. 9, Pt. 2, method 24-5.5, pg. 422. Analysis by AA or ICP.
Organic Matter	Percent	ASA Mono. No. 9, Pt. 2, method 29-3.5.2, pg. 570

B. ORGANIC AMENDMENTS - Organic amendments will consist of suitable organic materials, preferably composted and weed free, that will be used to supplement the organic content of surface soils within treatment areas. Organic amendments will be composed entirely of organic materials; inorganic materials may not be present. Organic amendments may be supplied in bag or bulk formats. Organic amendment weight and content analysis statements or labels will be supplied to the Atlantic Richfield

Company. Organic amendments used on the treatment area will be uniform in composition and in good condition for application by suitable equipment. Any organic amendments that are or become contaminated or damaged, making it unsuitable for use, will not be accepted.

C. FERTILIZER - Fertilizer will consist of plant available nutrients. Fertilizer will be delivered in standard size bags or in bulk quantities. All bags will be labeled showing chemical analysis and manufacturer's name, or for bulk quantities, accompanied with written chemical analysis from the manufacturer. Fertilizer will be uniform in composition and in good condition for application by suitable equipment. It will be labeled with the manufacturer's guaranteed analysis as governed by applicable fertilizer laws. Any fertilizer which becomes contaminated or damaged, making it unsuitable for use, will not be accepted.

D. SUITABLE PLANT MATERIALS - Suitable plant materials include those plant species that are naturally adapted to an area that are suited for use in the revegetation of disturbed sites. Grass, forbs, sub-shrub, shrub and tree plant forms may be naturally adapted and represented depending upon site conditions and climatic factors. Suitable plant materials may be available in a variety of forms including seed, sprigs, stakes, plugs, sod, transplants (bare-root or containerized) or other commercially available reproductive forms. One of three vegetation types will be established on treatment areas using either sod or seed.

1. Sod. Sod furnished by the Contractor will have a good cover of living or growing grass. This will be interpreted to include grass that is seasonally dormant during the cold or dry seasons and capable of renewing growth after the dormant period. All sod will be obtained from areas where the soil is reasonably fertile and contains a high percentage of loamy topsoil. Sod will be cut or stripped from living, thickly matted turf relatively free of weeds or other undesirable foreign plants, large stones, roots, or other materials which might be detrimental to the development of the sod or to future maintenance. Any vegetation more than 6 inches in height will be mowed to a height of 3 inches or less before the sod is lifted. Sod, including the soil containing the roots and the plant growth showing above, will be cut uniformly to a thickness not less than that recommended by the sod supplier.

2. Seed. All seed must comply with and be labeled in accordance with applicable laws and regulations. Seed used for this work must meet the requirements and specifications listed below, with seed bag labeling that includes the following information:

   - Seed lot number or other distinguishing mark;
   - Common name, genus, species, subspecies and variety, when applicable, including the name of each kind of seed present in excess of 5%. When two or more kinds of seed are named on the

label, the label will specify the percentage of each. When only one kind of seed is present in excess of 5% and no variety name or type designation is shown, the percentage must apply to seed of the kind named. If the name of the variety is given, the name may be associated with the name of the kind. The percentage in this case may be shown as "pure seed" and must apply only to seed of the variety named;

- State or county of origin;
- Approximate percentage of viable seed, together with the date of test. When labeling mixtures, the percentage viability of each kind will be stated;
- Approximate percentage by weight of pure live seed, meaning the freedom of seed from inert matter and from other seeds;
- Approximate percentage by weight of sand, dirt, broken seeds, sticks, chaff and other inert matter;
- Approximate total percentage by weight of other seeds;
- Name and approximate number of each kind of species of prohibited and restricted noxious weed seeds occurring per pound of seed; and
- Full name and address of the person, firm or corporation selling the seed.

Seed mixtures will not contain "noxious or targeted" weed seed. Seed provenance will be suitable for the job site and will be a standard grade adapted to Colorado conditions. Seed which has become wet, moldy or otherwise damaged will not be accepted.

E. MULCH AND TACKIFIER - Mulch may consist of either hydromulch fiber, hay or straw mulch, and tackifier. Hydromulch will be composed of wood, paper or synthetic fiber. Mulch material will be composed of grass hay, wheat straw, rye straw, or barley straw, in that order of preference. All hay or straw mulch used on this project will be certified "Weed Seed Free".

Tackifier will be a biodegradable organic formulation processed specifically for the adhesive binding of mulch. Manufacturer's specifications and material content, and handling procedures for tackifier products will be supplied to Atlantic Richfield.

1. Hydromulch. Hydromulch may only be used on the project as dictated by site-specific conditions and approved by Atlantic Richfield. Its use will be primarily limited to small yards where hay or straw mulch could be a nuisance to the homeowner. Hydromulch will be composed of wood, paper or synthetic fiber, mixed with a tackifier and applied at a rate of one (1) ton per acre in 5,000 gallons of water.

2. Hay/Straw Mulch. Hay/straw mulch may only be used on the project as dictated by site-specific conditions and approved by Atlantic Richfield. Vegetative mulch material will be composed of grass hay, wheat straw, rye straw, or barley straw, in that order of preference. Chopped or ground material is not acceptable. The mulch material is not acceptable if it is musty, moldy or rotted, or if it contains seed-bearing stalks of noxious weeds. It will be free of stones, dirt, roots, stumps or other foreign material.

   a. Grass Hay. This type of mulch material will be composed primarily of perennial grasses. The grass hay mulch will contain greater than 70% grass by weight and will not contain greater than 10% alfalfa, crested wheatgrass or yellow sweet clover. Grass hay must be "Noxious Weed Seed Free Hay" provided by a certified supplier and is subject to Atlantic Richfield's approval.

   b. Straw. This type of mulch material will be clean grain straw, will be "Noxious Weed Seed Free" straw and will not contain greater than 5% cereal seed by weight (i.e., seed heads). Written confirmation from a certified supplier verifying that the straw mulch material meets or exceeds these minimum requirements will be required to be submitted to Atlantic Richfield.

3. Tackifier. Tackifier will be a biodegradable organic formulation processed specifically for the adhesive binding of mulch. The tackifier will uniformly disperse when mixed with water and will not be detrimental to the homogeneous properties of the mulch slurry. Any tackifier which has been moisture damaged or damaged by other means will not be acceptable. Tackifier may be added either during the manufacturing of the mulch or incorporated during mulch application. Organic soil and mulch tackifier for use in hydraulic planting of seeds will consist of specifically blended compatible hydrocolloids. Starch-based tackifiers are unacceptable.

320.3 CONSTRUCTION REQUIREMENTS

The Contractor is responsible for providing all labor, equipment, tools and supplies required to perform this job. Required work, including testing borrow for fertility (per the test methods in Table 320-1 above), finishing, topsoiling, fertilizing, seeding, mulching and tackifying, will be performed to the satisfaction of Atlantic Richfield. Satisfactory performance of revegetation activities on the treatment areas may require repeated operations until approved by Atlantic Richfield. Any remobilization associated with performing revegetation activities a second or subsequent time will be absorbed in the applicable Contract unit price; additional reimbursement for subsequent performance of these activities is not authorized. Specific requirements for each phase of this work are described below.

A. ORGANIC AMENDMENT - The plant growth medium will be evaluated for organic matter content and amended as indicated by analysis. Soil organic

content levels will be adjusted to a target level of 1% by weight for the top 4 inches of the soil profile. The amount of organic amendment required for each treatment area will be calculated. Organic amendments will be spread evenly over the surface to be treated and incorporated using appropriate equipment to a depth not to exceed 4 inches.

B. FERTILIZING - Reconstructed plant growth mediums shall be analyzed for plant fertility levels and fertilized with an inorganic chemical fertilizer as required. Soil fertility target levels for sod lawn, and native lawn and native yard treatment areas are provided in Table 320-2.

Table 320-2 - Soil Fertility Target Levels

Vegetation Type	Parameter	Target Level
Sod Lawn		
	N	23-30 lbs/acre
	P	15 ppm
	K	120 ppm
Native Lawn/Native Yard		
	N	10-20 lbs/acre
	P	15 ppm
	K	120 ppm

Application of the entire soil-test recommended application rate of phosphorous and potassium fertilizer will be completed immediately prior to sodding or seeding. Mechanical or hydraulic methods of application are acceptable that result in a uniform application at the specified target rate and ensure that the seedbed is not adversely impacted. The fertilizer application method is subject to approval by Atlantic Richfield. Nitrogen, due to its effect on weed growth, volatility and potential to burn vegetation, shall be applied in split applications with one-third applied prior to seeding or sodding and two-thirds after seedling germination (to the 5-leaf stage or older) or sodding.

Granular fertilizer will be incorporated into the surface soil by discing, raking, or shallow plowing to a maximum depth of 4 inches. Exceptions will be made for seed drills that are capable of incorporating the fertilizer and seed directly into the seedbed. In no instance will subsoil be incorporated into the seedbed as a result of this operation. Fertilizer will be incorporated with equipment operated at right angles to the slope of the land to the extent this is physically possible.

C. REVEGETATION - One of three vegetation types may be selected for establishment on treatment areas including: 1) Sod Lawn, 2) Native Lawn, or 3) Native Yard. Property owners, in consultation with and at the approval of Atlantic Richfield, will select one of these vegetation types for that portion(s)

of their property that is to be revegetated following treatment. Descriptions of these three vegetation types and the methods that will be used to establish them are presented in the subsections below.

1. Sod Transplanting

   a. Treatment Areas. Treatment areas to be solid, strip, or spot sodded will be as shown on the Individual Site Work Plans (ISWPs). Treatment areas requiring special ground surface preparation such as aggregate placement and areas to remain undisturbed will also be as shown on the ISWPs, and will not be revegetated.

   b. Suitable Equipment. Suitable equipment necessary for proper preparation of the ground surface and for the handling and placing of all required materials will be on hand, in good working condition, and will be approved by Atlantic Richfield before the various operations commence. Before starting the various sod transplanting operations, the Contractor will demonstrate to the satisfaction of Atlantic Richfield that the application of required materials will be made as specified.

   c. Ground Surface Preparation. After grading of areas has been completed and before applying organic amendments or fertilizer (where specified), areas to be sodded will be raked or otherwise cleared of stones larger than 2-inches in any diameter, sticks, stumps, and other debris which might interfere with sodding, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other means occurs after grading of areas, the Contractor will repair such damage, to the satisfaction of Atlantic Richfield. This may include, but is not limited to, filling low areas, smoothing irregularities and repairing other incidental damage.

   d. Obtaining and Delivering Sod. Atlantic Richfield will inspect and approve the source of the sod. The sod will be cut with approved sod cutters so that it has a uniform thickness and is not less than 2-inches thick after it has been transported and placed on the prepared bed, but before it has been compacted. Sod sections or strips will be cut in uniform widths and lengths not less than 10 inches and 18 inches, respectively. Individual pieces of sod must be small enough to be readily lifted without breaking, tearing, or loss of soil. Sod must be rolled with the grass facing inside during transportation and storage. Sod will be rolled or stacked at an appropriate moisture condition to minimize heating and decomposition.

   e. Sod Transplanting Schedule. The sod will be transplanted within 48 hours from the time it is stripped, unless circumstances beyond the Contractor's control make storage

necessary. In such cases, upon approval by Atlantic Richfield, the sod will be stacked, kept moist, and protected from exposure to the air and sun and will be protected from freezing. Sod will be cut and moved only when the soil moisture conditions are such that favorable results can be expected. Where the soil is too dry, permission to cut sod may be granted only after it has been watered sufficiently to moisten the soil to the specified cut depth.

f. Sod Placement. Sod placement will be performed only during the seasons when satisfactory results can be expected. Frozen sod will not be used. Excessively dry areas (as determined by Atlantic Richfield) specified to receive sod application will be watered to moisten the underlying soil to a depth of at least 4 inches immediately prior to laying the sod.

g. Moisture Conditions. The sod will be moist and will be placed on a moist earth bed. Pitchforks will not be used to handle sod, and dumping sod from vehicles will not be permitted. The sod will be carefully placed by hand, edge to edge and with staggered joints, in rows at right angles to the slopes, commencing at the base of the area to be sodded and working upward. The sod will immediately be pressed firmly into contact with the sod bed by tamping or rolling with approved equipment to provide a true and even surface without displacement of the sod or deformation of the surfaces of sodded areas. Should sod be displaced during transplanting operations, the workmen replacing such sod will work from ladders or treaded planks to prevent further displacement. Soils of good quality will be used to fill all cracks between individual sod pieces. The quantity of the fill soil will not cause smothering of the grass. Where the grades are such that the flow of water will be from paved or concrete surfaces across sodded areas, the surface of the soil underlying the sod will be set approximately one inch below the pavement or concrete edge after compaction. Where the flow will be over the sodded areas and onto the paved or concrete surfaces, the surface of the soil underlying the sod will be placed flush with pavement or concrete edge after compaction.

h. Critical Planting Area Anchors. On slopes steeper than 1 vertical to 2½ horizontal and in V-shaped or flat-bottom ditches or gutters, the sod will be pegged with wooden pegs not less than 12 inches in length and with a cross-sectional area of not less than ¾ square inch. The pegs will be driven flush with the surface of the sod.

i. Watering. Adequate water and watering equipment must be on hand before sodding begins, and sod will be kept moist until

installation is complete and its continued growth assured. In all cases, watering will be done in a manner that will avoid erosion from the application of excessive quantities of water and will avoid damage to the finished surface.

j. Establishing Turf. The Contractor will provide general care for the sodded areas as soon as the sod has been laid until Atlantic Richfield has accepted the Work.

k. Protection. All sodded areas will be protected against traffic or other use by warning signs or barricades approved by Atlantic Richfield.

l. Repairs. When the surface has become gullied or otherwise damaged during installation, the affected areas will be repaired to re-establish the grade and acceptable condition of the soil, including organic content and fertilization, as directed by Atlantic Richfield, and will then be re-sodded.

2. SEEDING NATIVE LAWNS OR NATIVE YARDS - A variety of native plant species may be used to establish native vegetation in treatment areas. Two distinct typical seed mixtures have been formulated to establish native vegetation. At the discretion of the land owner, in consultation with and at the approval of Atlantic Richfield, one or the other seed mixture will be applied to designated areas when a native vegetation cover is to be provided rather than a sod lawn. The two seed mixtures that may be used for establishment of native vegetation are either the Native Lawn or Native Yard seed mixture. The native seed mixtures may use any of the plant species contained in Table 320-3. The allowable plant species selection options in these seed mixtures is intended to permit final formulation immediately prior to use that reflects the availability of species in the native seed marketplace.

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Table 320-3 - Rico Native Vegetation Seed Mixtures

Common Name	Genus Species	Approximate Number of Seeds per Pound	Habit	Origin	Life Cycle	Potential Native Lawn Species
Graminoids						
alpine timothy	Phleum alpinum	1,044,689	Graminoid	Native	Perennial	Yes
beardless wheatgrass	Pseudoroegneria spicata ssp. inermis: Whitmar	145,000	Graminoid	Native	Perennial	
bluebunch wheatgrass	Pseudoroegneria spicata ssp. spicata: Goldar	125,680	Graminoid	Native	Perennial	
green needlegrass	Nassella viridula: Lodorm	167,840	Graminoid	Native	Perennial	
Idaho bentgrass	Agrostis idahoensis	6,000,000	Graminoid	Native	Perennial	
Idaho fescue	Festuca idahoensis	450,000	Graminoid	Native	Perennial	Yes
James' galleta	Pleuraphis jamesii	151,850	Graminoid	Native	Perennial	
Letterman's needlegrass	Achnatherum lettermanii	225,000	Graminoid	Native	Perennial	
little bluestem	Schizachyrium scoparium	240,670	Graminoid	Native	Perennial	
littleseed ricegrass	Piptatherum micranthum	385,000	Graminoid	Native	Perennial	
mountain muhly	Muhlenbergia montana	1,500,000	Graminoid	Native	Perennial	
muttongrass	Poa fendleriana	2,000,000	Graminoid	Native	Perennial	Yes
nodding brome	Bromus anomalus	119,333	Graminoid	Native	Perennial	
oniongrass	Melica bulbosa	200,000	Graminoid	Native	Perennial	
purple lovegrass	Eragrostis spectabilis	1,059,100	Graminoid	Native	Perennial	
Sandberg bluegrass	Poa secunda: Canbar	1,046,960	Graminoid	Native	Perennial	Yes
sheep fescue	Festuca ovina	530,320	Graminoid	Native	Perennial	Yes
sideoats grama	Bouteloua curtipendula:	159,200	Graminoid	Native	Perennial	
Forbs						
Colorado blue columbine	Aquilegia caerulea	399,600	forb	Native	Perennial	
hairy false goldenaster	Heterotheca villosa	336,500	forb	Native	Perennial	
low pussytoes	Antennaria dimorpha	7,000,000	forb	Native	Perennial	
silverleaf phacelia	Phacelia hastata	153,000	forb	Native	Perennial	
slender cinquefoil	Potentilla gracilis	1,711,698	forb	Native	Perennial	
western yarrow	Achillea millefolium var. occidentalis	3,411,818	forb	Native	Perennial	
woolly groundsel	Packera cana	600,000	forb	Native	Perennial	

a. Native Lawn. A typical native lawn seed mixture will include 3 or 4 native grass species that will provide a more conventional lawn-like appearance, while being better adapted to environmental conditions in Rico, Colorado. A typical Native Lawn seed mixture is provided in Table 320-4. It will be seeded at the target rate of 60 pure live seeds ("pls") per square foot (about 2.8 pls pounds per acre). It can be planted using either drilling or broadcast seeding methods. Broadcasting is the preferred seeding method. Supplemental watering shall be applied as directed and until the seeding is accepted by

Atlantic Richfield, after which the landowner will be responsible for watering during the establishment stage to facilitate growth and development of the native lawn.

Table 320-4 - Typical Native Lawn Seed Mixture

Total seeds per acre = 2,613,600			**Total acres = 1.0**		
		Pure Live Seeds per square foot = 60			
Common Name	**Desired Species %**	**No. Seeds/ Pound**	**PLS in Mix for Desired Blend**	**Pounds PLS per Acre**	**PLS per Square Foot**
Grasses					
alpine timothy	25	1,044,689	653,400	0.625	15.00
muttongrass	25	2,000,000	653,400	0.327	15.00
Sandberg bluegrass	25	1,046,960	653,400	0.624	15.00
sheep fescue	25	530,320	653,400	1.232	15.00
Total (%, PLS/Acre, PLS Pounds/Acre, PLS/Square Foot)	**100**		**2,613,600**	**2.8**	**60.0**

b. Native Yard. The Native Yard seed mixture contains a mixture of graminoids and forbs that will establish native mountain meadow vegetation. A typical native yard seed mixture is presented in Table 320-5. The native yard seed mixture will typically include 8 to 10 grass species and 4 to 5 forb species. It will be seeded at the target rate of 50 pls per square foot (about 7.3 pls pounds per acre). This seed mixture may be planted using either drill or broadcast seeding methods. Broadcasting is the preferred method of planting.

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Table 320-5: Typical Native Yard Seed Mixture

Total seeds per acre = 2,178,000					Total acres = 1.0
		Pure Live Seeds per square foot = 50			
Common Name	**Desired Species (%)**	**No. Seeds/ Pound**	**PLS in Mix for Desired Blend**	**Pounds PLS per Acre**	**PLS per Square Foot**
Grasses					
alpine timothy	10	1,044,689	217,800	0.208	5.00
beardless wheatgrass	8	125,680	174,240	1.386	4.00
green needlegrass	8	167,840	174,240	1.038	4.00
little bluestem	8	240,670	174,240	0.724	4.00
mountain muhly	8	1,500,000	174,240	0.116	4.00
muttongrass	8	2,000,000	174,240	0.087	4.00
nodding brome	6	119,333	130,680	1.095	3.00
purple lovegrass	8	1,059,100	174,240	0.165	4.00
sheep fescue	8	530,320	174,240	0.329	4.00
sideoats grama	8	159,200	174,240	1.094	4.00
Grass Total (%, PLS/Acre, PLS Pounds/Acre, PLS/Square Foot)	**80**		**1,742,400**	**6.243**	**40.00**
Forbs					
Colorado blue columbine	5	399,600	108,900	0.273	2.50
silverleaf phacelia	5	153,000	108,900	0.712	2.50
slender cinquefoil	5	1,711,698	108,900	0.064	2.50
western yarrow	5	3,411,818	108,900	0.032	2.50
Forb Total (%, PLS/Acre, PLS Pounds/Acre, PLS/Square Foot)	**20**		**435,600**	**1.1**	**10.0**
Seed Mixture Total (%, PLS/Acre, PLS Pounds/Acre, PLS/Sq. Ft.)	**100**		**2,178,000**	**7.3**	**50**

c. Seedbed Preparation. Treatment areas to be seeded and fertilized will be completed in reasonable conformity to

specified lines and grades prior to seeding and fertilizing, and are subject to approval by Atlantic Richfield. The Contractor will obtain Atlantic Richfield's permission to commence seedbed preparations and seeding operations.

The Contractor will prepare a seedbed on treatment areas to attain, as practicable and physically possible, the following described seedbed conditions:

- The soil will not be excessively wet, snow-covered, or frozen during seedbed preparation or seeding operations;
- The soil will be reasonably free of large lumps, clods, and impervious crusts of dirt;
- There be no appreciable areas of excessively loose soils that can feasibly be compacted; and
- Surface soil, to a minimum depth of approximately 4 inches, will not be so tightly compacted that seedlings cannot germinate and permanently establish.

Excessively tight or compacted soils will be loosened to a minimum depth of 4 inches. Seedbed preparations and seeding operations, including but not limited to, discing, harrowing, tilling, or hand raking of the soil, will be done at right angles to the natural flow of water on the slopes, unless otherwise approved by Atlantic Richfield. When required, compaction of excessively loose soil will be performed by equipment that will produce a uniform rough textured surface ready for seeding and mulching.

Existing structures and facilities will be adequately protected and any damage done by the Contractor will be repaired or adjusted at the expense of the Contractor, to the satisfaction of Atlantic Richfield. Atlantic Richfield will provide the contractor with a site map showing the location and type of all existing structures and facilities that need to be avoided or protected from damage.

d. Timing Of Seeding Operations. Treatment areas finished during the period of October 1 through June 14 will be topsoiled and seeded with the specified seed mixture within this time period. Treatment areas finished during the period of June 15 through September 30 will be topsoiled and mulched as necessary to minimize excessive erosion, pending commencement of seeding operations. The permanent seeding of these areas will commence during the fall at any time on or after October 1.

Seed will be applied to the conditioned seedbed no longer than 48 hours after the seedbed has been conditioned. If climatic conditions result in soil surface crusting between seedbed conditioning and seed application, including the 48 hour period specified above, any such crusting will be treated and satisfactorily alleviated prior to the commencement of seeding operations.

e. Seeding Density. Calculations of "pure live seed" will be made on the basis of either: 1) a germination test or 2) a tetazolium test and will be in addition to the purity analysis. Seeding rates have been determined on a "pure live seed per square foot" basis. However, since seed mixtures are supplied and handled on a bulk pound basis, the Contractor will be responsible for determining and applying the required amount of bulk seed mixture on each lot to achieve the specified pure live seed per square foot density for the type of seed mixture being planted.

Procuring the correct amount of pure live seed for the project is the responsibility of the Contractor. The amount of pure live seed to be applied will be based on the application rates specified in the seed mixture tables provided in this specification. The Contractor will work with the seed supplier to ensure that the purity and germination factors associated with each seed lot used in the seed mixtures will provide the specified percentage of seed on the pure live seed basis specified for each species contained in the seed mixture. Since plant species contained in the seed mixture may be selected from the potential species list and therefore vary, the typical seed mixture will need to be formulated appropriately and supplied to the seed supplier to ensure that target percentages for each species are met. It is the responsibility of the Contractor to ensure that variations in the seed mixtures provided in the tables take into consideration the deletion or addition of plant species. Plant species percentages must be adjusted when substitutions, deletions or additions are made to ensure that the seed mixture total percentage equals 100%.

Determining the bulk pounds of seed mixture required for a given lot will be accomplished as follows:

(1) Determine the combined total area of all lots to be seeded;

(2) Determine the total bulk pounds of seed mixture received;

(3) Divide the area of the lot to be seeded by the total combined area;

(4) Multiply the total bulk pounds for the entire seeding area by the ratio determined in (3). The result is the bulk pounds of seed mixture required for the specified seeding area.

f. Adverse Weather Conditions. Seeding operations will not be conducted during adverse weather conditions that would interfere with their proper application or distribution, as determined by Atlantic Richfield.

g. Seed Cover. The applied seed will be covered by a soil thickness equal to or less than ½ inch in depth, regardless of the method of application. Following broadcast seeding, back-dragging the surface will be used to assist in covering and lodging the seed in the seed bed. Care will be taken during back-dragging to ensure that the seed is not buried too deep by multiple passes over the same surface area.

h. Seeding Methods. Drill seeding or broadcasting seeding methods may be used to apply the seed mixtures to the treatment areas. Due to the size of the treatment areas and the proximity of facilities and structures, broadcast seeding will be the preferred method of seeding. Drill seeding may be conducted where the configuration of the treatment area allows the efficient use of drill seeding equipment, while avoiding adverse impacts to the seedbed or ability to evenly distribute the seed mixture within the treatment area. Requirements for these seeding methods are described in greater detail in the subsections below.

(1) Broadcast Seeding. Seeding by hand or mechanical broadcasting will be performed when soil conditions are appropriate as previously described. Extenders will be used as necessary to facilitate distribution of the seed mixtures. The amount of extender to be used will be based on the amount and type of seed mixture that is to be applied. When used, extenders will be inert and of a size and texture that promotes the even mixing and distribution of the seed mixture to which it is added. Broadcast seeding will be performed methodically to ensure that the seed mixture is evenly applied across the treatment area. Pin flagging or other suitable markers will be used to facilitate even distribution, as needed. Broadcast seeding will only be performed when ambient conditions will allow proper distribution of the seed mixtures; broadcasting will be avoided during excessively windy periods.

(2) Drill Seeding. Seeding equipment used for applying grass seed must be designed, modified or equipped to regulate the application rate and planting depth of grass seed. If drill seeding equipment is not equipped with press wheels, the seed will be compacted with a cultipacker immediately after the ground has been drilled. Seed must be uniformly distributed in the drill hopper during the drilling operation. Acceptable drills include: custom seeders, furrow drills, disc drills, no till drills or other seed drills approved by Atlantic Richfield. All grass establishment equipment will be operated perpendicular to the slope drainage. Planting depth will be regulated by depth bands or coulters. To provide for more even distribution of seed on sloping areas, the drill box will be partitioned by dividers no more than 24 inches apart. A drill will be no wider than the width of the area over which it is to operate. The rows of planted seed will be a maximum of 8 inches apart and will be positioned at right angles to the natural slope of the treatment area.

3. MULCHING AND TACKIFYING

a. General. Mulch, when required, must be applied to seeded areas not more than 72 hours after seeding regardless of the type used. If the Contractor does not mulch within 72 hours after seeding, the Contractor may be required to re-seed the project at no additional cost. Mulch will not be applied in the presence of free surface water, but may be applied upon damp ground. Mulch will not be applied to snow-covered ground surfaces.

Mulch will not be applied to areas having a substantial vegetative growth, such as grasses, weeds and grains. Areas to be mulched will be determined by Atlantic Richfield. Mulching will not be done during adverse weather conditions or when wind has the potential to prevent uniform application. Application, if after seeding, will be in a manner to not seriously disturb the seedbed surface.

b. Application Of Hydromulch. Hydromulch will be applied after seeding and fertilizing is completed. Mulch will be applied to all areas that have southern exposures and full sunlight. Application of mulch will be optional on slopes with northern exposures or southern exposures that are partially or fully shaded.

Hydroulch will be applied in a uniform manner by a hydroseeder at a rate of 2,000 pounds per acre mixed with

tackifier in approximately 5,000 gallons of water. When used, hydromulch spreading equipment will be designed specifically for this type of work.

Unless otherwise specified by Atlantic Richfield, hydromulch will be anchored to the seedbed through the application of a tackifier at an approximate rate of 100 pounds per acre or at the manufacturer's recommended application rate, as approved by Atlantic Richfield.

c. Application Of Vegetative Mulch. Vegetative mulch will be applied after seeding and fertilizing is completed. Vegetative mulch materials include certified weed-free hay or straw. Hay generally has longer and more resilient fibers than straw. Hay and straw mulch must be in good condition and not rotted or mildewed. Mulch will be applied to all areas that have southern exposures and full sunlight. Application of mulch will be optional on slopes with northern exposures or southern exposures that are partially or fully shaded.

Mulch will be applied in a uniform manner by a mulch spreader or by hand at a rate of 2,000 pounds per acre. When used, mulch spreading equipment will be designed specifically for this type of work.

Unless otherwise specified by Atlantic Richfield, straw or hay will be anchored to the seedbed through the application of a tackifier. Straw or hay mulch will be pliable. If straw breaks during application, it will be sprinkled with water, not soaked, to facilitate placement.

If a mulch crimper is used, it will be specifically designed for this type of work, will have round, flat (not angled), notched blades of these approximate dimensions: ¼ inch thick by 18 inches in diameter and spaced 8 to 9 inches apart. The crimper will have sufficient weight to force the vegetative mulch a minimum of 3 inches into the soil and will be equipped with disc scrapers. Mulch crimping will only be performed on slopes capable of being safely traversed by a tracked vehicle without down-slope slippage. All mulch crimping will be done perpendicular to the slope.

c. Finishing. Prior to final acceptance of the project, the Contractor will immediately re-mulch any area from which the original mulch may have been washed or blown. If the original seedbed and seeding is damaged due to the displacement of the mulching material, the seedbed will be repaired and reseeded prior to re-mulching. The operations described in this paragraph will be at the Contractor's expense, if damage occurs that must be repaired that is due to his negligence.

When used, soil and mulch tackifier will be applied at a target rate of 85 pounds per acre on all slopes regardless of their angle, or at the manufacturer's recommended application rate, as approved by Atlantic Richfield.

When applied, the organic soil and mulch tackifier will form a loose chain-like protective film, but not a plant inhibiting membrane, which will allow moisture to percolate into the underlying soil, while helping "stick" seeds, fertilizer and other specified materials to the soil surface during germination and initial seedling growth and establishment, after which time period the organic soil and mulch tackifier will biodegrade through microbial action.

END OF SECTION 320

SECTION 540: PROVIDE WATER

540.01 GENERAL

A. DESCRIPTION - This item shall consist of furnishing and applying water required in all compaction work, hydromulching and/or conventional mulching, and dust control all in accordance with the requirements of these Specifications.

540.02 MATERIALS

Water shall be reasonably clean and free from acid, oil, alkali, or vegetable substances and shall not be brackish or salty. Contractor shall not use water from the St. Louis Ponds mine discharge treatment system, or other sources known or reasonably inferred to contain elevated concentrations of metals (e.g., adit discharges, seeps from mine waste deposits, etc.). The Contractor shall be responsible for obtaining any necessary water rights, permits, and for payment of any royalty costs on the water provided. The source of water to be used shall be indicated to Atlantic Richfield prior to its use.

540.03 CONSTRUCTION METHODS

Water, when required, shall be applied at the locations and in the amounts required to properly complete the Work. An adequate supply of water shall be provided by the Contractor to complete the project as specified. The equipment used for watering shall be of ample capacity (minimum capacity of 1,000 gallons) and of such design as to assure uniform application of water in the amount required.

Equipment used for fire control shall be capable of providing a minimum of 100 gallons per minute (gpm) of water at sufficient pressure to successfully accomplish the specified work. Extension hoses may be required for this work.

In the watering of subgrades and embankments, Atlantic Richfield may require the Contractor to apply water in such quantities that the subgrade and embankment shall be compacted to a moisture content in excess of "optimum moisture." When so required, the amount of water required in excess of "optimum moisture" will not be greater than 3%. The Contractor shall also apply water during the course of the Work to control dust, maintaining all embankment and base courses in a damp condition.

The Contractor shall provide watering for dust control during construction, haul of soils or borrow, and for maintenance of traffic on public roadways and other access roads as required by Atlantic Richfield.

END OF SECTION 540

SECTION 550: TRAFFIC CONTROL

550.01 GENERAL

A. DESCRIPTION - Traffic control shall consist of furnishing, installing, maintaining, and relocating necessary traffic signs, barricades, lights, signals, pavement markings, and other traffic control devices necessary to insure the safety of the general public and project personnel. This work shall include flagging for the guidance of traffic through the work zone(s) and the furnishing and application of water for dust control.

B. OPERATIONS - The Contractor shall conduct his operations so that there is a minimum interruption in the use of the roads and highways involved at all times.

The Contractor shall schedule his operations to keep all roads and streets open to a minimum of one-way traffic during normal working hours during construction. Two-way traffic shall be provided at all times during overnight and weekend periods.

All work shall be coordinated with the Town of Rico and the Colorado Department of Transportation (CDOT), as appropriate, and shall be performed in accordance with the Contract Documents, the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) as published by the U.S. Department of Transportation, the approved Traffic Control Plan, and as otherwise required by Atlantic Richfield.

C. SUBMITTALS

1. Traffic Control Plan. The Contractor shall submit a traffic control plan for any work involving public roadways. All traffic control plans shall be submitted to Atlantic Richfield and accepted prior to construction and shall include, but are not necessarily limited to, the following as appropriate:

   - Signing and/or flagging, as appropriate to the encroachment and traffic.
   - Temporary road closures.
   - Signage during non-work hours.
   - Proposed haul route plan for haul of Townsite soils to the soil lead repository and for hauling borrow from the North Rico (St. Louis Ponds) borrow areas or other off-site borrow areas to the Townsite Work locations.

The input of the Town of Rico and CDOT shall be sought, as appropriate, in preparation of the Traffic Control Plan. No work shall commence until all approvals of the Traffic Control Plan have been secured.

550.02 MATERIALS

All traffic control devices and materials shall be in accordance with the requirements of the Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways, most current edition and with applicable CDOT standard specifications, most current edition.

550.03 CONSTRUCTION REQUIREMENTS

Before placement of any traffic control for any stage of construction, the Contractor shall have on hand, at the project site, all necessary traffic control devices required for that construction stage. All traffic control devices necessary for construction shall be properly placed and in operation and approved before any construction is allowed to start. All devices shall be constructed and erected in a workmanlike manner and shall be properly maintained, cleaned, and operated during the entire time they are used. They shall remain in place only as long as they are needed and shall be removed immediately thereafter. Where operations are performed in stages, there shall be in place only those signs that apply to the present stage of construction. Signs that do not apply to the existing conditions shall be covered with opaque material, turned, or removed, so as not to be readable to oncoming traffic.

Construction equipment, vehicles, materials, and debris shall be stored or parked a minimum of 30 feet from the edge of the traveled way or behind guardrails, etc., as appropriate. When it is not feasible to park equipment or store materials a minimum of 30 feet from the edge of the traveled way or behind guardrails, adequate warning devices and protective measures shall be utilized.

All traffic control devices furnished by the Contractor shall remain the property of the Contractor and shall be removed from the project when their use is no longer required. All properly installed traffic control devices shall be replaced by the Contractor when destroyed by traffic.

The Contractor shall schedule his construction operations in a manner that will assure: 1) the safety and convenience of motorists and pedestrians, and the safety of construction workers, are adequately met at all times; and 2) the project is completed in a manner most beneficial to the project as a whole. Traffic control shall be provided in full compliance with MUTCD during materials hauling and equipment operation or transport along public roadways. No separate payment will be made for traffic control and all costs for traffic control shall be absorbed in other work items included in the Contract payment terms.

The Contractor shall plan haul routes for soil disposal and borrow hauling to best meet all of the following requirements to the maximum extent practicable:

- Minimize the distance of haul travel routes within residential and commercial areas in the Town of Rico.
- Maximize the use of Highway 145 within the Town of Rico as a haul route.
- Take the most direct route practicable from the site of the Work to Highway 145.
- Do not utilize the existing unpaved sidehill road connecting the North Rico (St. Louis Ponds) site to the north Rico residential area without the specific authorization of Atlantic Richfield.
- Minimize the number of haul trips to the extent practicable.
- Do not haul before 7:00 am or after 7:00 pm without specific authorization from Atlantic Richfield.

These requirements shall be specifically addressed in the Traffic Control Plan specified in Section 550.01, C.1. above.

END OF SECTION 550

SECTION 820: AGGREGATE AND ROCK MULCH SURFACING MATERIALS

820.01 GENERAL

A. DESCRIPTION - This Work shall consist of furnishing and placing aggregate and/or rock mulch surfacing courses composed of crushed gravel, or stone, or other similar materials meeting the grade or maximum size(s) specified in these Technical Specifications or as shown on the Drawings (including the Individual Site Work Plans (ISWPs)). Placement shall be in conformance with these specifications.

B. SUBMITTALS - The following submittals are required:

- Gradation(s) of all specified aggregate materials.
- Standard Proctor, including moisture density curve for General Crushed Top Surfacing Materials (Aggregate Mix No. 1).

C. REFERENCE STANDARDS - Standard Proctor Density, where referenced herein, shall refer to AASHTO T-99. Other standards shall be as noted herein.

820.02 MATERIALS

A. GENERAL CRUSHED TOP SURFACING MATERIALS – To be installed on aggregate driveways, aggregate walkways, and parking/storage areas.

1. GENERAL - Materials specified to be applied as the top surface on aggregate driveways, aggregate walkways, and parking/storage areas shall consist of both fine and coarse fragments of crushed stone or crushed gravel, and/or natural gravel, and when approved by Atlantic Richfield Company, may be blended with sand, finely crushed stone, crusher screenings, or other similar materials. The completed mixture of aggregates shall be capable of being compacted into a dense and well-bonded base.

   The method used in production shall be such that the percentage of fractured particles occurring in the finished product shall be as nearly constant and uniform as practicable. The crushing shall result in a product such that at least 20% of the material retained on a U.S. Standard No. 4 mesh sieve will have at least one fractured face. If necessary to meet this requirement or to eliminate an excess of fines or uncrushed particles, gravel shall be screened before crushing.

2. GRADATION - As specified for Colorado Department of Transportation, Class 6, Aggregate Base Course, the general crushed top surfacing material shall meet the following gradation requirements:

TABLE OF GRADATION – GENERAL CRUSHED TOP SURFACING MATERIAL (AGGREGATE MIX No. 1)

Sieve Size	Percentage (by Weight) Passing Square Mesh Sieves
3/4"	100
No. 4	30 - 65
No. 8	25 - 55
No. 200	3 - 12

a. General crushed top surfacing material shall be placed to a nominal depth of 3-inches (+0.1-foot and –0.0-foot tolerance).

B. ROCK MULCH SURFACING MATERIALS

1. GENERAL - Mixed aggregate and coarse-grained soil/rock materials specified to be applied as the top surface in previously vegetated excavated areas that are not to be revegetated shall consist of a reasonably non-erosive mixture of aggregate, oversize rock fragments from screening of backfill, coarse-grained natural soils, and/or rounded coarse alluvial fan deposits ("river rock"), as approved by Atlantic Richfield. The standard sizes of aggregate described in this classification may be manufactured by means of any suitable process used to separate raw material into the desired size range. Standard sizes may also be produced by blending two or more different components.

2. GRADATION – As determined by ASTM C 136 (Method for Sieve Analysis of Fine and Coarse Aggregates) the decorative top surfacing material shall meet the following gradation requirements:

TABLE OF GRADATION – ROCK MULCH SURFACING MATERIALS (AGGREGATE MIX No. 2)

Sieve Size	Percentage (by Weight) Passing Square Mesh Sieves
2"	100
1½"	90 – 100
1"	50 - 70
3/4"	10 - 30
No. 4	0 - 5

C. OTHER TOP SURFACING MATERIALS – Other materials (e.g., lava rock, colored rock, wood or bark chips, etc.) specified to be applied as the top surface on rock gardens, pathways, other specified areas, or as directed by Atlantic Richfield shall consist of the same, or reasonably similar material as that which was removed. In these situations, the material proposed by the Contractor shall be approved by Atlantic Richfield and the Landowner prior to installation.

820.03 CONSTRUCTION REQUIREMENTS

A. GENERAL - Immediately prior to placing the top surfacing course, the surface of the underlying embankment or subgrade shall be smooth and shaped before the top surfacing course is placed. No top surfacing course shall be placed upon wet or muddy materials.

The material shall be mixed and placed in horizontal layers of not more than 6-inches loose thickness, except as allowed by Atlantic Richfield. In driveway areas and alleys, the excavation floor (subgrade) shall be moisture conditioned and compacted, as appropriate, to assure that overlying backfill embankment will attain the compaction specification. General backfill embankment in driveway areas and alleys shall be compacted (maximum 6-inch loose lifts) to attain 95% of Standard Proctor Density at $\pm$ 3% of Optimum Moisture Content.

The depositing and spreading of the material on the prepared subgrade shall commence at the point farthest from the point of loading, unless otherwise instructed, and shall progress continuously without breaks. Hauling over the subgrade will not be permitted at such times and in such manner as to be detrimental to the subgrade. The material shall be deposited and spread in a uniform layer without segregation of size to such loose depth that when compacted, the layer will have the required thickness. Spreading shall be as necessary to distribute the material in a uniform layer.

Material placed shall be compacted to the full width by rolling with approved equipment. Any irregularities or depressions that develop under rolling shall be corrected by loosening the material in these places and adding or removing material, as the case may require, until the surface is smooth and uniform.

Spreading and compacting shall be performed alternately as required to maintain a smooth, even, uniformly compacted surface until the final inspection. Along structures and at all places not accessible to the roller, the surfacing course material shall be tamped thoroughly with approved mechanical tampers or hand tampers to obtain a density conforming to the compaction requirements.

B. COMPACTION REQUIREMENTS FOR TOP SURFACING COURSES - The Contractor shall provide watering and rolling as required to obtain a field density of 95% of Standard Proctor Density in aggregate driveway, walkway and parking/storage areas (not applicable to areas specified to receive Aggregate Mix No. 2).

END OF SECTION 820

Table 2 (Revised 2/19/05)
GROUNDWATER QUALITY DATA
Concentration (ug/l)

	GW0/ GW1		GW2	GW3	GW4		GW5		GW6		GW7		GW8	
Parameter (Date Sampled)	(10/2002)	(11/2004)	(10/2002)	(10/2002)	(10/2002)	(11/2004)	(10/2002)	(11/2004)	(10/2002)	(11/2004)	(10/2002)	(11/2004)	(10/2002)	(11/2004)
Arsenic, dissolved	17 U	0.1 U	17 U	17 U	17 U	0.4 B	17 U	15	17 U	28.8	17 U	0.3 B	220	7.1
Arsenic, total		37.8				2.6		152		174		1.3		162
Barium	58 J		67 U	17 J	39 J		19 J		33 J		15 J		30 J	
Cadmium, dissolved	2 U	0.2 B	2 U	2 U	2 U	1.1	2 U	3.3	15	0.4 U	7	9	2	1.7 B
Cadmium, total		8.6				3.7		36.9		1.8		7		4.5
Calcium, dissolved		82,700				246,000		632,000		502,000		374,000		444,000
Chromium, dissolved		0.3 B				0.2 U		0.5 U		0.5 U		0.2 U		0.5 U
Chromium, total		147				4.3		9.2		1.1		1.3		3.4
Copper, dissolved	1.2 U	1.7 B	1.2 U	1.2 U	1.2 U	7.4	1.2 U	23	5	1 B	1.2 U	4.1	1.2 U	1 U
Copper, total		300				9.9		657		16		16.2		42
Iron, dissolved	160	70	1,100	95	2,300	230	4,600	1,420	630,000 J	8,790	180	2,780	41,000	178,000
Iron, total recoverable		1,180,000				6,030		46,100		33,900		14,800		245,000
Lead, dissolved	14 U	0.2 B	14 U	14 U	14 U	0.1 B	14 U	138	14 U	13.1	14 U	5.9	14 U	48
Lead, total		524				10.7		4430		194		46.2		632
Magnesium, dissolved		10,000				26,500		38,100		56,500		42,600		126,000
Manganese, dissolved	0.5 U	121	2,800	430	1,700	591	4,700	4,380	42,000	7,320	840	2,420	8,100	25,400
Manganese, total recoverable		48,800				655		5,360		7,090		2,440		24,300
Mercury, dissolved	0.03 U	0.2 U	0.03 U	0.03 U	0.03 U	0.2 U	0.03 U	0.2 U	0.03 U	0.2 U	0.03 U	0.2 U	0.03 U	0.2 U
Nickel, dissolved		10 U				10 B		30 B		1.7 R		30 B		80 B
Nickel, total		860				10 U		20 U		5.9 R		20 B		20 U
Potassium, dissolved		1,700				2,100		5,600		8,200		2,700		23,500
Selenium, dissolved		0.7				0.2 B		0.6 B		0.2 U		0.4 B		0.2 B
Selenium, total		1				0.1 B		0.2 U		0.2 U		0.3 B		0.3 B
Silver, dissolved		0.05 U				0.05 U		0.2 U		0.2 U		0.1 U		0.2 U
Silver, total		2.88				0.25 B		16.7		0.6		0.37		1.7
Sodium, dissolved		4,400				11,700		15,000		11,600		10,300		10,500
Zinc, dissolved	12 J	10 U	64 J	380 J	73 J	50 B	7,100 J	7,750	4,700 J	230	670 J	2,230	220 J	9,440
Zinc, total		7,140				180		14,000		390		2,230		9,510
Bicarbonate as CaCO3		152,000				75,000		127,000		150,000		68,000		4,000 B
Carbonate as CaCO3		2,000 U				2,000 U		2,000 U		2,000 U		2,000 U		2,000 U
Chloride		1,300 B				500 U		500 U		500 U		600 B		1,000 B
Cyanide, WAD		5 U				5 U		5 U		5 U		5 U		5 U
Dissolved Oxygen (D0)		4.01				4.32		1.02		0.97		0.65		1.52
Hardness as CaCO3		248,000				724,000		1,740,000		1,490,000		1,110,000		1,630,000
Hydroxide as CaCO3		2,000 U				2,000 U		2,000 U		2,000 U		2,000 U		2,000 U
pH		6.64				6.82		6.83		6.37		6.03		6.24
Residue, Filterable (TDS) @180		230,000				970,000		2,250,000		2,080,000		1,550,000		2,910,000
Residue, Non-Filterable (TSS)		103,000,000 H				42,000 H		472,000 H		82,000 H		104,000 H		224,000 H
Sulfate		57,200				469,000		1,220,000		1,050,000		834,000		1,790,000
Total Alkalinity		152,000				75,000		127,000		150,000		68,000		4,000 B

B - The associated numerical value was detected below the CRDL, but greater than the method detection limit and is therefore an estimate (qualified by laboratory software). Presence of the compound is reliable.
J - The associated numerical value is an estimated quantity because the Quality Control criteria were not met
U - The analyte was not detected at reported concentration and method detection limit (qualified by laboratory software).
H - Analysis exceeded method hold time. pH is a field test with an immediate hold time.
R - Retest value with greater precision due to apparent discrepancy in original results
See Figure 4B for Well Locations